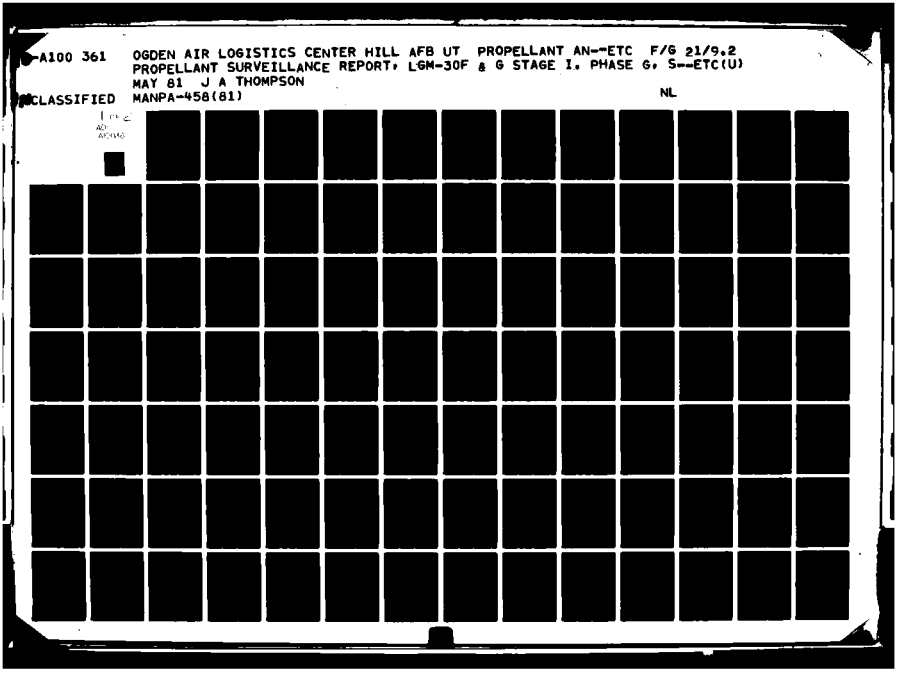

LEVEL II

(2)

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OGDEN AIR LOGISTICS CENTER

UNITED STATES AIR FORCE

HILL AIR FORCE BASE, UTAH 84056

PROPELLANT SURVEILLANCE REPORT LGM-30 F&G STAGE 1 PHASE G, SERIES I TP-H1011

PROPELLANT ANALYSIS LABORATORY

MANPA REPORT

458(81)

MAY 1981

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MMWRBM PROJECT M04046C-WNL0529

PROPELLANT SURVEILLANCE REPORT. LGM-30F & G STAGE 1, [redacted]

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May 1981

Industrial Products and Landing Gear Division
Directorate of Maintenance
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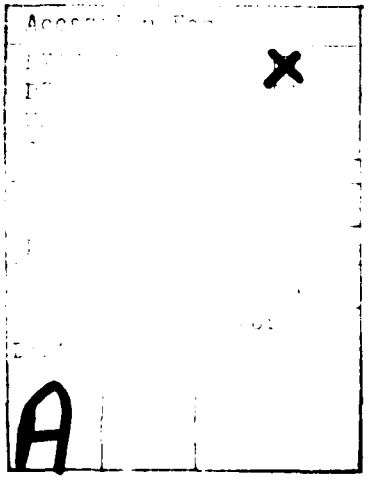
ABSTRACT

This report contains propellant test results from cartons of TP-H1011 bulk propellant representing LGM-30F and G First Stage Minuteman Motors. This report uses a statistical approach to analyze the bulk carton propellant data. Testing was accomplished in accordance with MMWRBM Project M04046C-WNL01529.

The data from this test period are combined with data from previous testing and entered into the G085 Computer for storage, analysis, and regression analysis. From the statistical analysis of all data tested to date (fifteen years for F & G), significant degradation of the propellant does not appear likely for at least two years past the oldest data point.

Each point on the regression plot represents the mean of all samples at that particular age. The number of samples at each point is indicated on the sample size summary sheet on the page accompanying each regression plot or group of regression plots. The data range at any age can be found by suitable inquiry of the G085 System.



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29A	Test Report (Missile in silo)	13 Jan 64
29B	Zero Time Test Results	29 Jan 64
29C	Zero Time Test Results (Supplement 1)	30 Mar 64
29D	Zero Time Test Results (Aft Closure)	9 Jun 64
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288	Propellant Surveillance Report LGM-30 A & B, Stage I, TP-H1043	Mar 74
290	Propellant Surveillance Report LGM-30 F & G, Stage I, Phase B, Series I TP-H1011	Mar 74
300	Minuteman Stage I Motor Reliability Improvement Program Surveillance	May 74

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302	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	Nov 74
313	Stage 1 Propellant Surveillance Report, Propellant Containing Glacial Acrylic Acid	Oct 74
315	Propellant Surveillance Report LGM-30 F & G Stage 1, TP-H1011	Jan 75
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330	Propellant Surveillance Report LGM-30 F & G Stage 1, TP-H1011	Oct 75
335	Stage 1 Motor Reliability Improvement Program	Dec 75
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339	Stage 1, New MAPO & ERL-510 Qualification	Mar 76
341	Propellant Surveillance Report LGM-30 Dissected Motors, Phase VII, TP-H1011	Mar 76

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345	Propellant Surveillance Report LGM-30 F & G, Stage 1 Phase B, Series III, TP-H1011	Jun 76
350	Qualification of a New MAPO Source and ERL-510 Curing Agent for Minuteman, Stage 1, UF-2121 Liner	Sep 76
351	Propellant Surveillance Report LGM-30 A & B, Stage 1, TP-H1011	Sep 76
354	Minuteman Stage 1 Motor Reliability Improvement Program Surveillance	Sep 76
358	Propellant Surveillance Report LGM-30 Dissected Motors, Phase VIII, TP-H1011	Oct 76
360	Propellant Surveillance Report LGM-30 F & G, Stage 1 Phase E, Series III, TP-H1011	Nov 76
367	Propellant Surveillance Report LGM-30 A & B, Stage 1, TP-H1011	Apr 77
370	Propellant Surveillance Report LGM-30 F & G, Stage 1, Phase E, Series II, TP-H1011	Apr 77
377	Qualification of a New MAPO Source and ERL-510 Curing Agent for Minuteman Stage 1, UF-2121 Liner	Oct 77
379	Final RIP Report, Minuteman Stage 1 Motor Reliability Improvement Program Surveillance	Oct 77
385	Propellant Surveillance Report LGM-30 A, B, F, & G, Stage 1, TP-H1043	Dec 77
388	Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011	Jan 78
390	Propellant Surveillance Report LGM-30 F & G Stage 1, Phase E, Series IV, TP-H1011	Feb 78
392	Propellant Surveillance Report LGM-30 Dissected Motors, Phase IX, TP-H1011	Mar 78
393	Propellant Surveillance Report LGM-30 A & B Stage I, TP-H1011	May 78

Report Nr	Title	Report Date
396	Propellant Surveillance Report LGM-30 F & G Stage I, TP-H1011	Jun 78
405	Propellant Surveillance Report LGM-30 F & G Stage I, TP-H1011	Oct 78
406	Propellant Surveillance Report LGM-30 Dissected Motors, Phase X, TP-H1011	Nov 78
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423	Propellant Surveillance Report LGM-30 F and G Stage I, TP-H1011	Oct 79
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452	Propellant Surveillance Report LGM-30 Dissected Motors, Phase XI, TP-H1011	Jan 81

GLOSSARY OF TERMS AND ABBREVIATIONS

Aging Trend	A change in properties or performance resulting from aging of material or component
CSA	Cross Sectional Area
DB	Dogbone
Degradation	Gradual deterioration of properties or performance
E	Modulus (psi), defined as stress divided by strain along the initial linear portion of the curve.
EB	End Bonded
EGL	Effective Gage Length
em	Strain at maximum stress
er	Strain at rupture
"F" ratio	The ratio of the variance accounted for by the regression function to the random unexplained variance. The regression function having the most significant "F" ratio is used for plotting data. The ratio is also used in detecting significant changes in random variation between succeeding time points
JANNAF	Joint Army, Navy, NASA, Air Force Committee
MANCP	Propellant Lab Section at Ogden Air Logistics Center
Ogden ALC	Ogden Air Logistics Center, Air Force Logistics Command
r or R	The Correlation Coefficient is a measure of the degree of closeness of the linear relationship between two variables
Linear Regression Equation	The general form of the linear regression equation is $Y = a + bx$
Regression Line	Line representing mean test values with respect to time
S_b	Standard error of estimate of the regression coefficient

GLOSSARY OF TERMS AND ABBREVIATIONS (cont)

S_e or $S_{Y.X}$	Standard deviation of the data about the regression line
Sm	Maximum Stress
Sr	Stress at rupture
Standard Deviation (S_y)	Square root of variance
Strain Rate	Crosshead speed divided by the EGL
"t" test	A statistical test used to detect significant differences between a measured parameter and an expected value of the parameter (determines if regression slope differs from zero at the 95% confidence level)
Variance	The sum of squares of deviations of the test results from the mean of the series after division by one less than the total number of test results
3 Sigma Band	The area between the upper and lower 3 sigma limit. It can be expected that 99.73% of the inventory represented by the test samples would fall within this range assuming that the population is normally distributed.
90-90 Band	It can be stated with 90% confidence that 90% of the inventory represented by the test samples would fall within this range assuming that the population is normally distributed
Significant	As used in the statistical sense, means a difference unlikely to have been the result of random sampling from some specified population.

INTRODUCTION

A. PURPOSE:

Laboratory testing has been performed for fifteen years on First Stage LGM-30F and G Minuteman Motor propellant blocks to evaluate the effects of aging on TP-H1011 propellant. This report contains those tests conducted on propellant as instructed in MMWRBM Test Directive GTD-1C, Amendment 2, LGM-30 First Stage Operational Propellant Laboratory Testing.

Statistical analysis of the data from tests performed will provide early warning if serious degradation trends develop. Annual evaluation of the propellant provides data for input into engineering reliability analysis for service life predictions.

B. BACKGROUND

LGM-30F and G testing was started in 1966 with phase testing at 24 month intervals (Report Numbers 78 - zero time; 104, 162, 185-Phase I; 176, 239, 257-Phase II; 271-Phase III). Report Number 257 was the first time that LGM-30F and G data were statistically analyzed seperately from LGM-30A and B data. The present report is a continuation of testing and statistical analysis.

Zero time testing for LGM-30A, B, F, and G was started as soon as possible after receipt of the propellant by MANPA. Data from these tests were used to establish a base line for each test parameter.

The LGM-30F and G propellant test matrix (Table 1) is used to determine the number of specimens to be taken from each propellant loaf and the specific test or tests to which these specimens are to be subjected. Very low rate and low rate tensile specimens are taken on all LGM-30F and G blocks. Specimens for other physical and combustion tests are taken from every third (LGM-30F and G) block.

TABLE 1

SAMPLE PLAN

The Procedure for determining tests to be performed on propellant batch samples of LGM-30 F & G First Stage Motors are as follows:

1. Divide the USAF motor serial numbers into three groups by dividing the last three digits of each serial number by three to determine the remainder integer, e.g., $154 \div 3 = 51$ with a remainder integer of 1.

2. Use the remainder integer to enter the following matrix to determine the group of tests to be performed on the forward, middle, and aft batch samples associated with a particular motor serial number.

GROUP MATRIX

TP-H1011 PROPELLANT BATCH SAMPLE	GROUP I	GROUP II	GROUP III
Forward	1	2	0
Middle	0	1	2
Aft	2	0	1

Each group will receive the following tests:

TEST MATRIX

GROUP I	GROUP II	GROUP III
High Rate Triaxial	Dynamic Response	High Rate Hydrostatic
Creep	Stress Relaxation	Sol Gel
Biaxial Low Rate	Burning Rate	DSC
TCLE	Heat of Explosion	TGA
Hardness	Pressure Time	DTA
Ignitability		Impact

NOTE: Low Rate and Very Low Rate Tensile tests are performed on all blocks.

STATISTICAL APPROACH

In order to determine aging trends for shelf/service life predictions, as directed by Service Engineering, First Stage LGM-30 F and G Minuteman TP-H1011 propellant blocks have been undergoing testing since 1966, statistically analyzed and reported on a regular test cycle by this laboratory.

The primary reason for performing statistical analysis on test data is for the detection of propellant changes due to aging that would affect motor reliability. Regression analysis was the method used to examine data and to aid in drawing conclusions about dependency relationships that may exist i.e., relationship between age versus test results.

In selecting the best fit model for the regression equation, the linear model $Y = a + bX$ was found to be the best fit model for the regression plots.

Individual data points from different time periods were used to establish a least squares trend line for the data. The variance about the regression line, obtained using individual values of the dependent variable, was used to compute a tolerance interval such that at the 90% confidence level 90% of the sample distribution falls within this interval. This tolerance interval was extrapolated to a maximum of 24 months into the future from age of the oldest motor tested. The 't' value and the significance of this statistic, which are reported for each regression model, give an indication of the "statistical significance" of the slope of the trend line as compared to a line of zero slope. When a regression slope is indicated to be significant, it should be noted that the slope of the regression line is significant from a statistical standpoint and it is an indication that a change over time is occurring, but does not necessarily mean that the indicated change in the

value obtained during testing is significant in regards to motor operational performance. In a few cases, this small change has become the apparent trend in data variance and regression line trends. However, the changes are gradual and no operational problems are expected at this time.

The data were plotted by computer. The 'y' axis is computed so that the values at one inch intervals are peculiar to the data spread of the parameter tested. Plotted data points represent means at the particular ages at which testing occurred. The number of specimens at each age point is indicated on the sample size summary sheet accompanying the regression plot. Variance at each test age can be determined by consulting the G085 data storage system.

A regression summary of all test parameters is included in Table 2. The direction of the regression trend lines are also indicated in Table 2. The slopes that are "statistically" not significant from a line of zero slope are labeled as such and those regressions have been left out of this report.

TEST RESULTS

VERY LOW RATE TENSILE:

Very low rate regressions show a statistically significant decrease for strain at maximum stress and strain at rupture. The stresses and modulus show a statistically significant increase (Figures 1 thru 5). The trends are gradual for the respective regressions and no operational problems from the propellant are expected for at least two years beyond the last test data.

LOW RATE BIAXIAL TENSILE:

The strain at maximum stress regression shows a statistically significant gradual increase with the strain at rupture showing no statistically significant change. The stresses and modulus show a statistically significant increase (Figures 6 thru 10).

LOW RATE TENSILE:

Low rate tensile data regressions show a statistically significant gradual decrease for strains and a statistically significant increase for stresses and modulus (Figures 11 thru 15).

HIGH RATE TRIAXIAL TENSILE:

The strain at maximum stress, strain at rupture and modulus regressions show a statistically significant decrease. Maximum stress shows a statistically significant increase. Stress at rupture does not show a significant change (Figures 16 thru 20).

HIGH RATE HYDROSTATIC TENSILE:

The strains show a statistically significant decrease. The stresses and modulus show a statistically significant increase (Figures 21 thru 25).

TEAR ENERGY:

The cohesive energy shows a statistically significant decrease (Figure 26).

TENSILE SUMMARY:

The test data regressions show that the strain is gradually decreasing and the stress and modulus gradually increasing.

Based on the analysis of test data regressions, it does not appear that meaningful degradation is occurring at this time and no operational problems are expected in the propellant for at least two years beyond the last data point.

STRESS RELAXATION MODULUS:

For the 0.5% strain at -65°F, the regressions for data at 10, 50, 100, and 1000 seconds show a statistically significant gradual increase. (Figures 27 thru 30).

At -40°F, the 10, 50, and 100 second regressions show a statistically significant increase. The 1000 second regression shows no statistically significant change. (Figures 31 thru 34).

The 3% strain regressions at 20°F, 77°F, 100°F, 140°F and 180°F show a statistically significant gradual increase. (Figures 35 thru 54).

SOL GEL:

The percent extractables, density and gel swell ratio do not show a significant change. The crosslink density regression shows a statistically significant increase (Figures 55 thru 58).

CONSTANT STRAIN:

A statistically significant gradual decrease is shown for constant strain (Figure 59).

HARDNESS:

Shore A ten second hardness shows a statistically significant increase (Figure 60).

SUMMARY OF SOL GEL, TENSILE AND HARDNESS DATA:

The crosslink density, constant strain, and hardness data regressions correlate with the tensile data. As the polymer continues to crosslink, the strains decrease and the stresses increase.

PRESSURE TIME:

Maximum pressure and time to maximum pressure shows a statistically significant gradual decrease (Figures 61 and 62).

TCLE (*Thermal Coefficient of* Linear Expansion):

The thermal coefficient of linear expansion for both above and below the glass transition point (Tg) shows a statistically significant gradual increase (Figures 63 and 64).

TGA (Thermal Gravimetric Analysis):

A statistically significant increase is shown for the ignition temperature (9°C rise/min), no significant percent weight loss at 250°C hold (12°C rise/min to hold) and a statistically significant weight loss at ignition (Figures 65 thru 67).

DTA (Differential Thermal Analysis):

The endotherm and first and second exotherms show a statistically significant decrease. The third exotherm shows a statistically significant increase and the ignition temperature with no significant change (Figures 68 thru 72).

BURNING RATE:

The burning rate shows a statistically significant gradual increase (Figure 73).

DIFFERENTIAL SCANNING CALORIMETER:

The endotherm and first and second exotherms shows a statistically significant decrease. (Figures 74 thru 76).

THERMAL AND COMBUSTION SUMMARY:

The time to maximum pressure from the pressure time data and burning rate data show a correlation. In both cases, the regressions show a gradual increase in rate of reaction. The maximum pressure and DSC regressions also correlate well with each other. In both cases, a gradual decrease in energy is shown.

The ignition temperatures for TGA shows a gradual increase.

From the analyses of the regressions, no combustion problems are expected for at least two years beyond the oldest data point.

CONCLUSIONS

Fifteen years of aging at ambient temperature ($77^{o}F$) has not greatly changed the properties of the propellant. Some test parameters indicate slight aging trends, but nothing that would adversely affect the operational characteristics of the rocket motor propellant.

From the statistical analysis, it does not appear that significant propellant degradation is occurring. Based on fifteen years of accumulated data, there is no reason to suspect that properties will show much change for at least two years past the last data point. Therefore, propellant reliability should not change appreciably over that time period. Since failure limits are not available for the parameters tested, this statement is based on the fact that the slope of the regression curves where statistically significant are, with few exceptions, relatively flat or close to a line of zero slope and have not changed appreciably from the last test period.

TABLE 2

Regression Summary

Test Parameter	Slope
Very Low Rate Tensile	
Strain at Maximum Stress	-
Maximum Stress	+
Strain at Rupture	-
Stress at Rupture	+
Modulus	+
Low Rate Biaxial Tensile	
Strain at Maximum Stress	+
Maximum Stress	+
Strain at Rupture	NS
Stress at Rupture	+
Modulus	+
Low Rate Tensile	
Strain at Maximum Stress	-
Maximum Stress	+
Strain at Rupture	-
Stress at Rupture	+
Modulus	+
High Rate Triaxial Tensile	
Strain at Maximum Stress	-
Maximum Stress	+
Strain at Rupture	-
Stress at Rupture	NS
Modulus	-
High Rate Hydrostatic Tensile	
Strain at Maximum Stress	-
Maximum Stress	+
Strain at Rupture	-
Stress at Rupture	+
Modulus	+
Tear Energy	-
Stress Relaxation	
-65^{o}, 10 sec	+
-65^{o}, 50 sec	+
-65^{o}, 100 sec	+
-65^{o}, 1000 sec	+
-40^{o}, 10 sec	+
-40^{o}, 50 sec	+
-40^{o}, 100 sec	+
-40^{o}, 1000 sec	NS

TABLE 2 (cont)

Regression Summary

Test Parameter	Slope
+20°, 10 sec	+
+20°, 50 sec	+
+20°, 100 sec	+
+20°, 1000 sec	+
+77°, 10 sec	+
+77°, 50 sec	+
+77°, 100 sec	+
+77°, 1000 sec	+
+100°, 10 sec	+
+100°, 50 sec	+
+100°, 100 sec	+
+100°, 1000 sec	+
+140°, 10 sec	+
+140°, 50 sec	+
+140°, 100 sec	+
+140°, 1000 sec	+
+180°, 10 sec	+
+180°, 50 sec	+
+180°, 100 sec	+
+180°, 1000 sec	+
Sol Gel	
% Extractables	NS
Density	NS
Gel Swell Ratio	NS
Crosslink Density	+
Constant Strain	-
Hardness, Shore A, 10 sec	+
Pressure Time	
Maximum Pressure	-
Time to Maximum Pressure	-
TCLE	
Above Tg	+
Below Tg	+
TGA	
Ignition Temperature	+
% Weight Loss at 250°	NS
% Weight Loss at Ignition	+

TABLE 2 (cont)

Regression Summary

Test Parameter		Slope
DTA		
	Endotherm 1	-
	Exotherm 1	-
	Exotherm 2	-
	Exotherm 3	+
	Ignition Temperature	NS
Burn Rate, 1000 psi		+
DSC		
	Endotherm	-
	Exotherm 1	-
	Exotherm 2	-

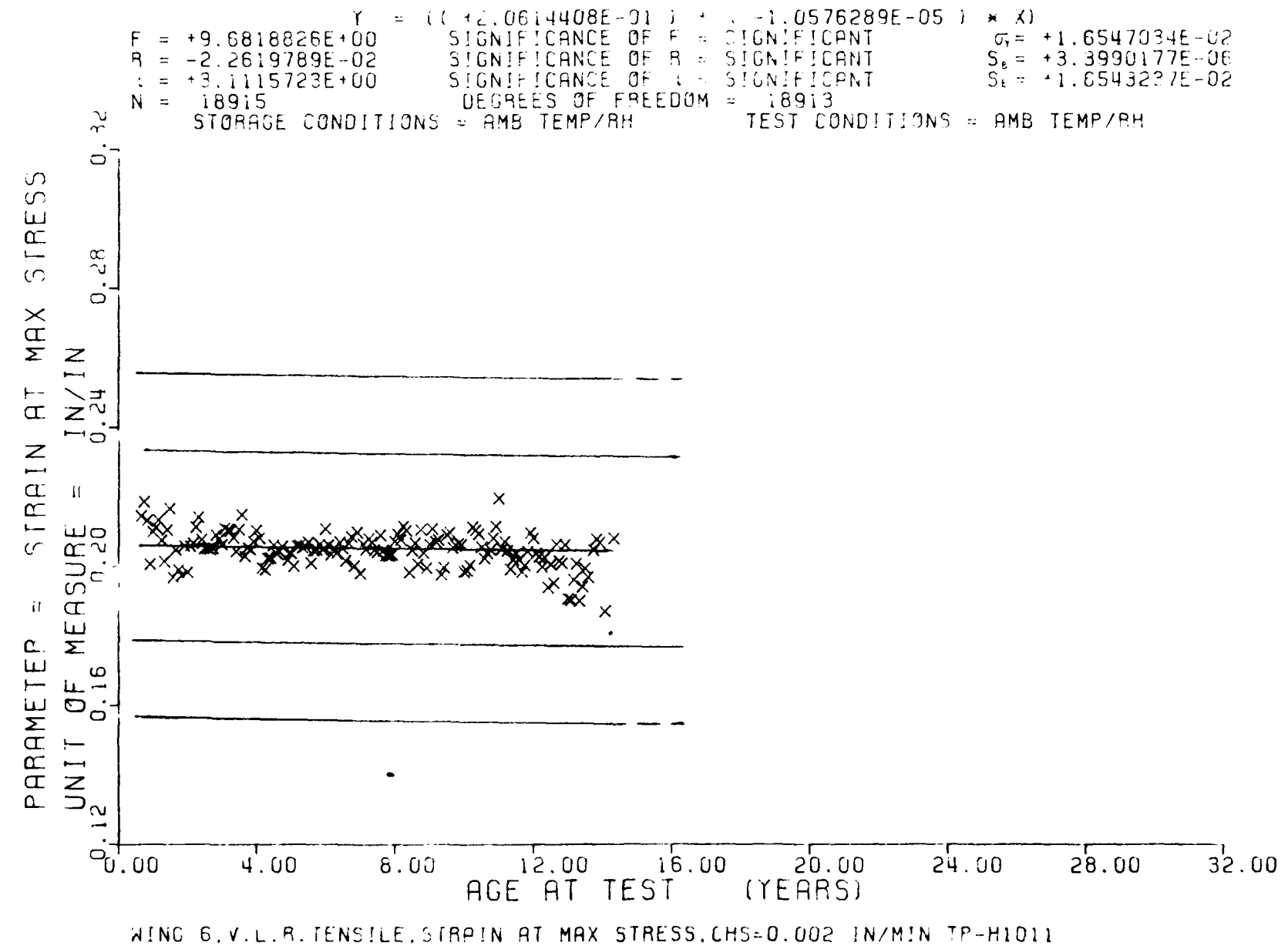
NS = Not Significant
- = Negative Slope
+ = Positive Slope

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
8	3	33	152	58	352	83	90	108	53	133	82
9	19	34	154	59	317	84	56	109	120	134	126
10	11	35	113	60	418	85	76	110	63	135	60
11	15	36	226	61	290	86	92	111	42	136	51
12	30	37	147	62	337	87	122	112	135	137	99
13	48	38	126	63	243	88	139	113	297	138	256
14	28	39	119	64	160	89	177	114	165	139	157
15	38	40	122	65	108	90	156	115	133	140	78
16	46	41	156	66	79	91	107	116	321	141	40
17	55	42	123	67	43	92	82	117	247	142	45
18	28	43	142	68	179	93	117	118	149	143	203
19	49	44	106	69	234	94	99	119	133	144	97
20	24	45	135	70	287	95	146	120	210	145	12
21	56	46	122	71	135	96	188	121	123	146	21
22	27	47	166	72	124	97	150	122	41	147	30
23	67	48	177	73	110	98	159	123	48	148	40
24	55	49	199	74	152	99	191	124	45	149	12
25	63	50	188	75	198	100	163	125	84	150	27
26	47	51	347	76	147	101	136	126	53	151	51
27	50	52	314	77	167	102	51	127	107	152	9
28	56	53	295	78	91	103	68	128	60	153	8
29	40	54	232	79	117	104	84	129	75	154	27
30	73	55	474	80	113	105	33	130	184	155	15
31	88	56	461	81	155	106	11	131	212	156	23
32	153	57	392	82	178	107	31	132	156	157	12
										158	21
										159	28
										160	9
										161	33
										162	18
										163	9
										165	9
										166	18
										167	20
										169	18
										171	3
										172	2

WING 6,V.L.P.TENSILE,STRAIN AT MAX STRESS,CHS=0.002 IN/MIN TP-H1011

This sample size summary is applicable to figures 1 thru 4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UNIT OF MEASURE = IN/IN
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0.16
0.20
0.24
0.28
0.32
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6,V.L.R.TENSILE,STRAIN AT MAX STRESS,CHS=0.002 IN/MIN TP-H1011

Figure 1

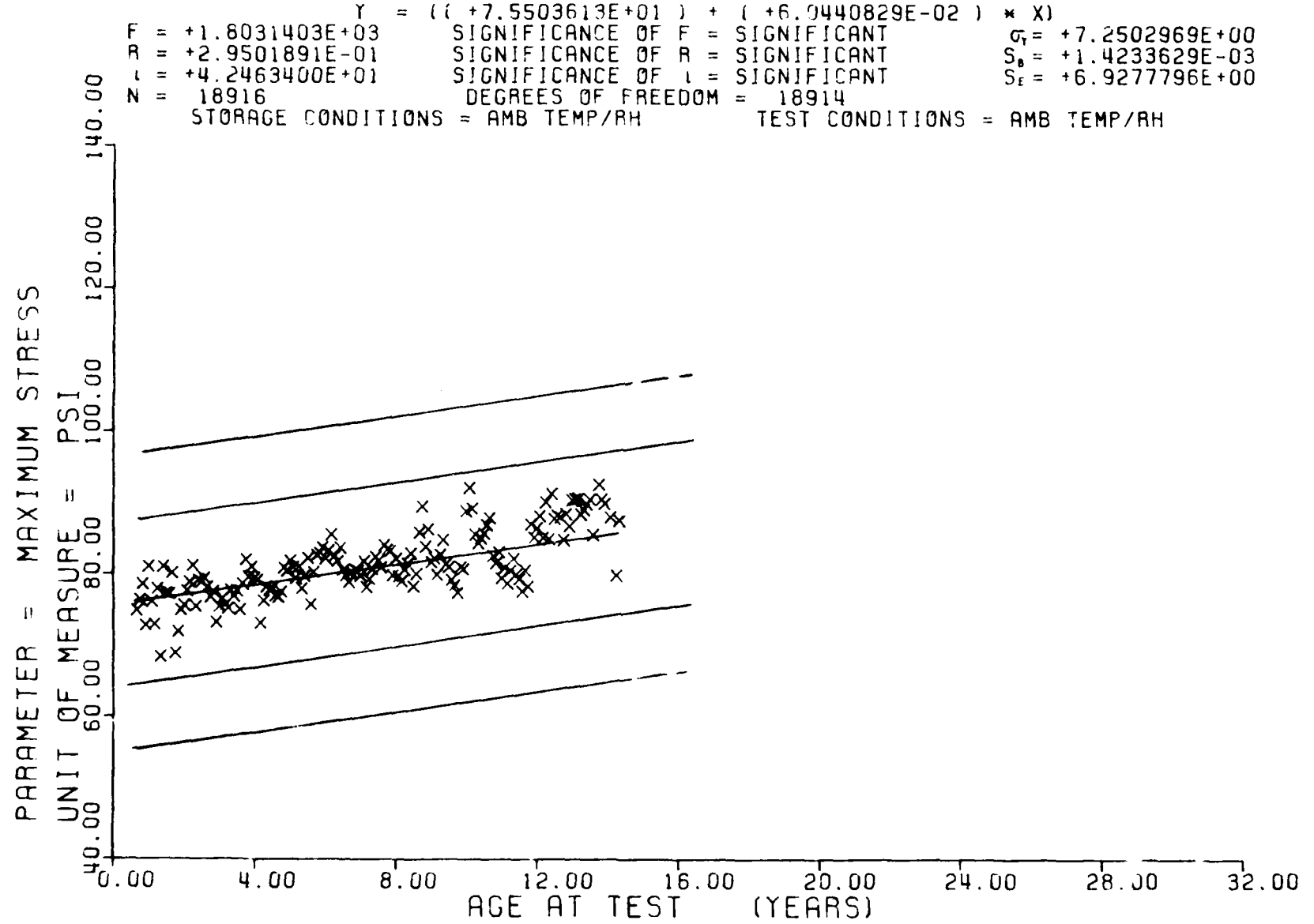

Y = ((+7.5503613E+01) + (+6.0440829E-02) * X)
F = +1.8031403E+03 SIGNIFICANCE OF F = SIGNIFICANT σT = +7.2502969E+00
R = +2.9501891E-01 SIGNIFICANCE OF R = SIGNIFICANT Sθ = +1.4233629E-03
ι = +4.2463400E+01 SIGNIFICANCE OF ι = SIGNIFICANT Sε = +6.9277796E+00
N = 18916 DEGREES OF FREEDOM = 18914
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI
140.00
120.00
100.00
80.00
60.00
40.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6.V.L.R.TENSILE,MAXIMUM STRESS,CHS=0.002 IN/MIN TP-H1011

Figure 2

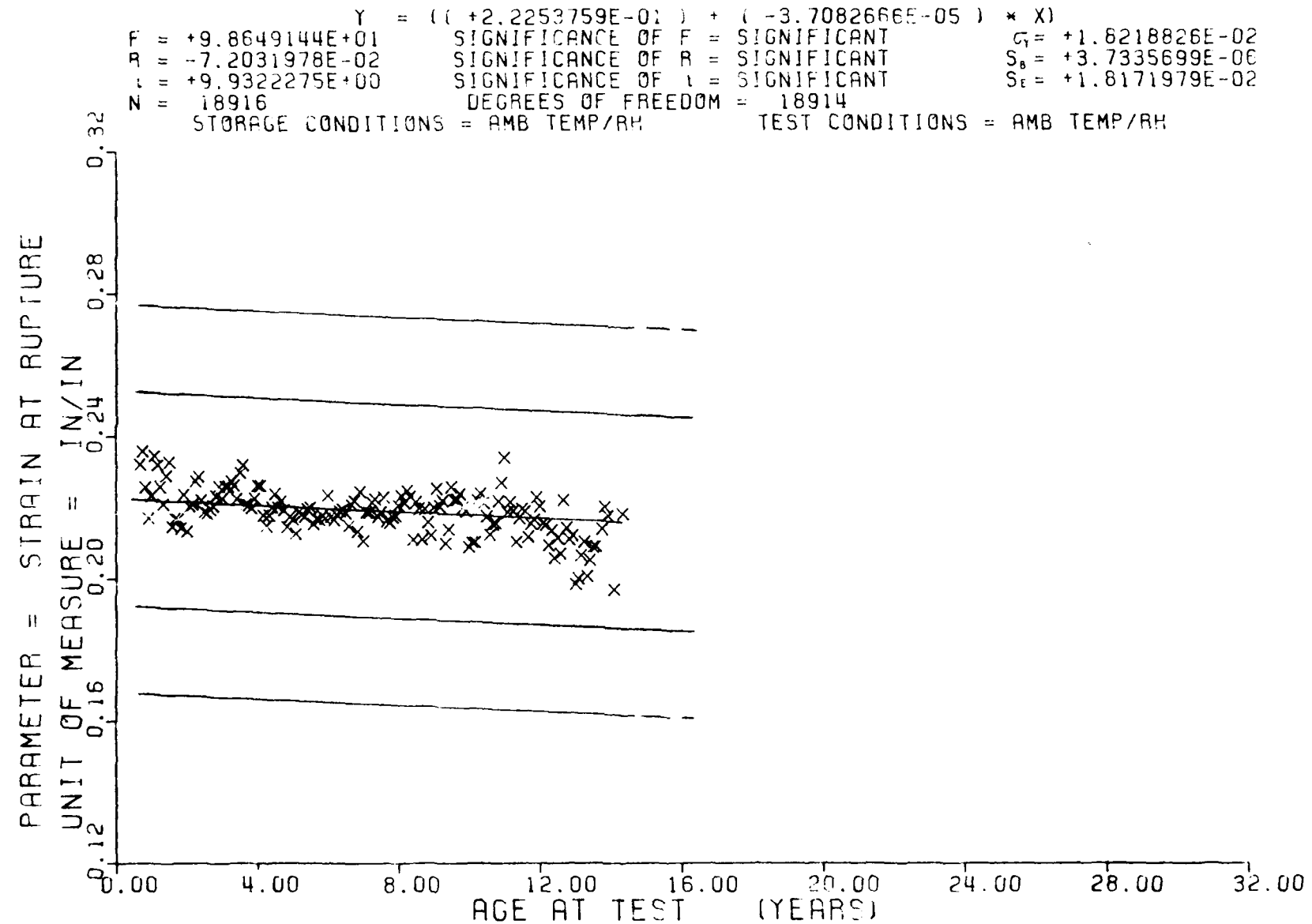

Y = ((+2.2253759E-01) + (-3.7082666E-05) * X)
F = +9.8649144E+01 SIGNIFICANCE OF F = SIGNIFICANT
R = -7.2031978E-02 SIGNIFICANCE OF R = SIGNIFICANT
t = +9.9322275E+00 SIGNIFICANCE OF t = SIGNIFICANT
N = 18916 DEGREES OF FREEDOM = 18914
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
σ_1 = +1.8218826E-02
S_B = +3.7335699E-06
S_E = +1.8171979E-02
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = IN/IN
0.12
0.16
0.20
0.24
0.28
0.32
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING B.V.L.B.TENSILE.STRAIN AT RUPTURE.CHS=0.002 IN/MIN TP-H1011

Figure 3

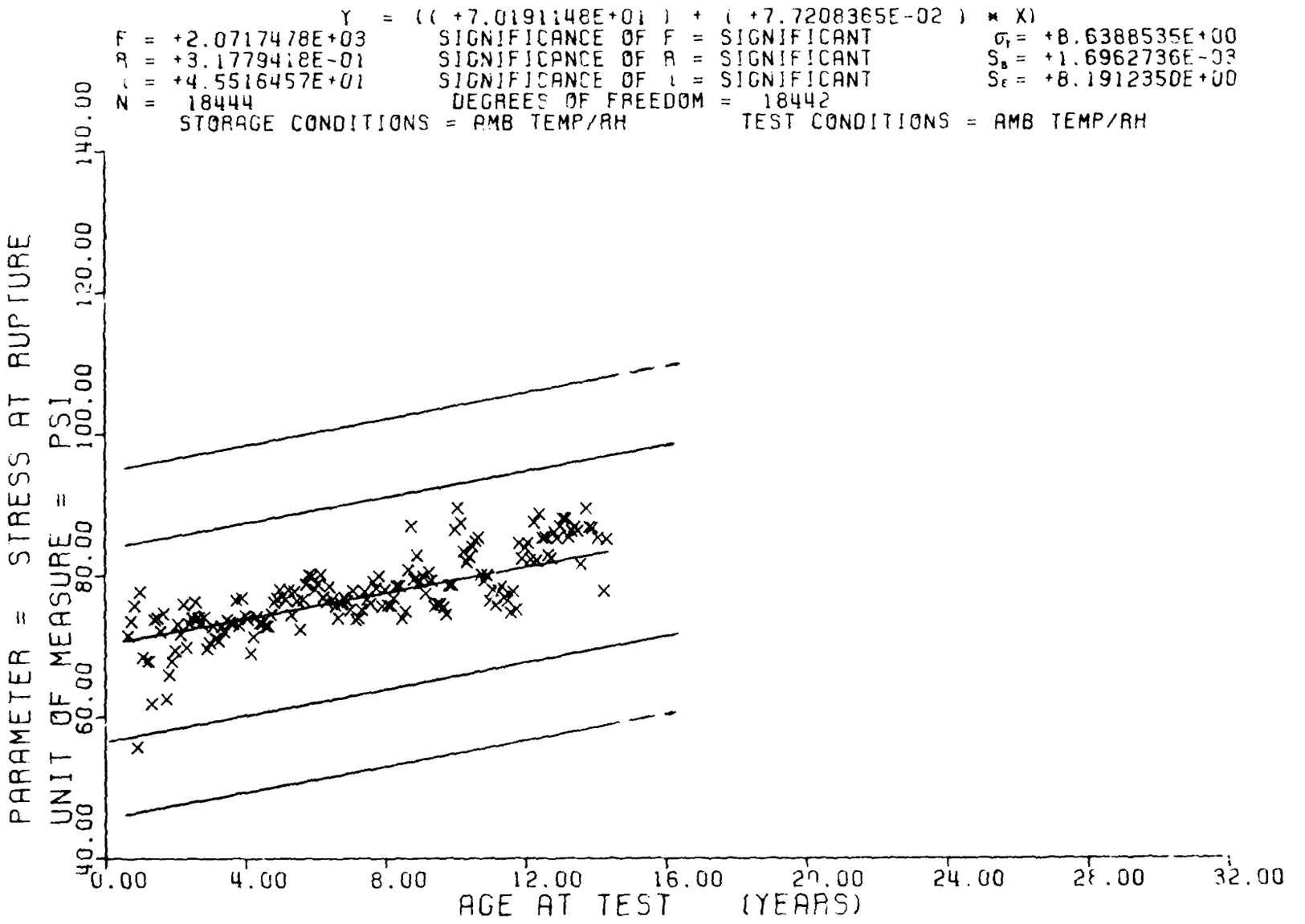

Y = ((+7.0191148E+01) + (+7.7208365E-02) * X)
F = +2.0717478E+03 SIGNIFICANCE OF F = SIGNIFICANT
R = +3.1779418E-01 SIGNIFICANCE OF R = SIGNIFICANT
t = +4.5516457E+01 SIGNIFICANCE OF t = SIGNIFICANT
N = 18444 DEGREES OF FREEDOM = 18442
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRESS AT RUPTURE
UNIT OF MEASURE = PSI
40.00
60.00
80.00
100.00
120.00
140.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6.V.L.R.TENSILE.STRESS AT RUPTURE.CHS=0.002 IN/MIN TP-H1011

Figure 4

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
8	3	33	152	58	352	83	80	108	93	133	84
9	19	34	154	59	344	84	56	109	120	134	126
10	11	35	113	60	442	85	76	110	63	135	60
11	15	36	226	61	293	86	91	111	42	136	51
12	30	37	147	62	342	87	122	112	141	137	99
13	48	38	126	63	259	88	138	113	303	138	256
14	23	39	119	64	160	89	177	114	168	139	157
15	35	40	122	65	105	90	156	115	133	140	78
16	46	41	156	66	79	91	107	116	327	141	40
17	55	42	123	67	47	92	82	117	250	142	45
18	28	43	142	68	174	93	117	118	149	143	203
19	49	44	106	69	234	94	99	119	133	144	97
20	24	45	135	70	287	95	145	120	192	145	12
21	56	46	122	71	138	96	188	121	111	146	24
22	27	47	166	72	121	97	150	122	41	147	30
23	67	48	177	73	110	98	159	123	48	148	40
24	55	49	199	74	152	99	191	124	48	149	12
25	63	50	188	75	198	100	163	125	84	150	27
26	47	51	347	76	147	101	136	126	53	151	54
27	50	52	314	77	167	102	51	127	107	152	9
28	57	53	295	78	89	103	68	128	60	153	8
29	40	54	232	79	117	104	84	129	75	154	27
30	73	55	474	80	113	105	33	130	184	155	15
31	88	56	463	81	155	106	11	131	215	156	23
32	153	57	390	82	178	107	31	132	156	157	12
										158	21
										159	28
										160	9
										161	33
										162	18
										163	9
										165	9
										166	18
										167	20
										169	18
										171	3
										172	2

>

WING 6,V.L.R.TENSILE.MODULUS,CHS=0.002 IN/MIN TP-H1011

This sample size summary is applicable to figure 5

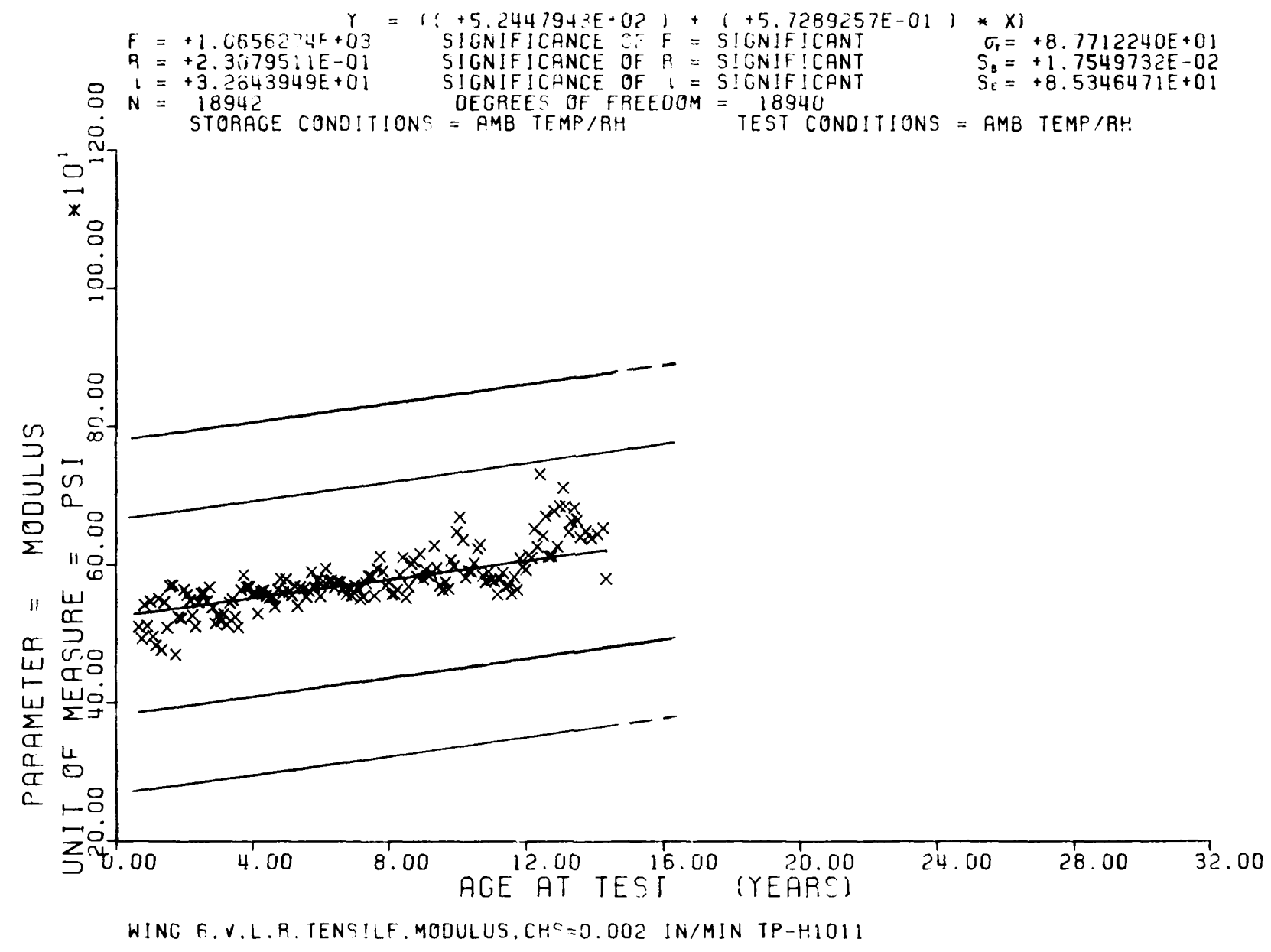

Y = (+5.2447943E+02) + (+5.7289257E-01) * X)
F = +1.0656274E+03 SIGNIFICANCE OF F = SIGNIFICANT σr = +8.7712240E+01
R = +2.3079511E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +1.7549732E-02
t = +3.2643949E+01 SIGNIFICANCE OF t = SIGNIFICANT Se = +8.5346471E+01
N = 18942 DEGREES OF FREEDOM = 18940
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI *10¹
120.00
100.00
80.00
60.00
40.00
20.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6.V.L.R.TENSILE.MODULUS.CHS=0.002 IN/MIN TP-H1011

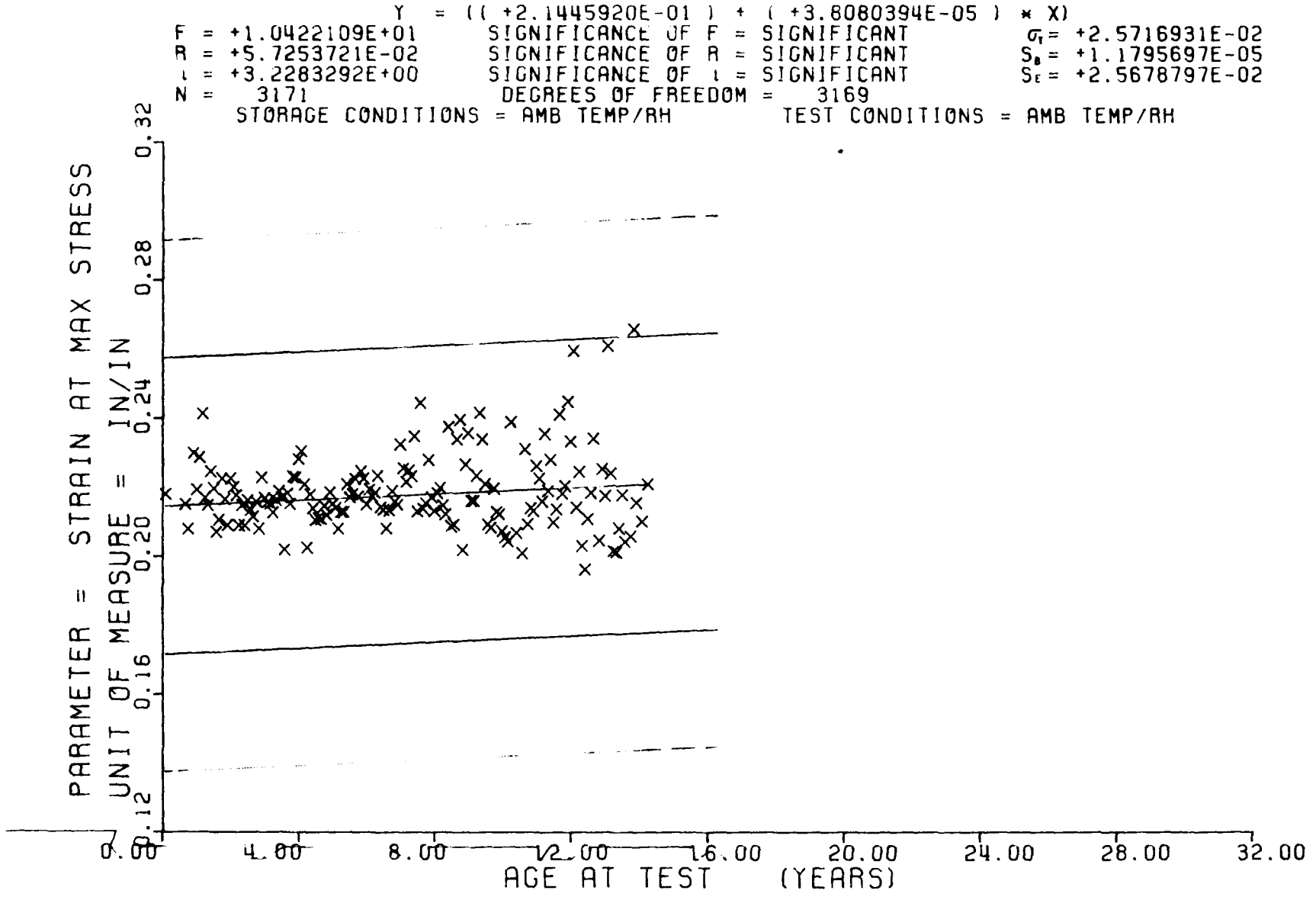
Figure 5

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	1	33	22	58	40	83	16	108	14	135	18
8	2	34	26	59	31	84	10	109	22	136	4
9	4	35	26	60	45	85	6	110	27	137	17
11	6	36	34	61	35	86	7	111	10	138	60
12	14	37	14	62	57	87	8	112	10	139	38
13	22	38	11	63	54	88	10	113	19	140	10
14	4	39	28	64	42	89	8	114	68	141	8
15	16	40	16	65	18	90	6	115	21	142	6
16	12	41	14	66	27	91	15	116	50	143	26
17	14	42	8	67	32	92	10	117	68	144	43
18	16	43	2	68	32	93	12	118	34	145	6
19	14	44	5	69	34	94	29	119	32	146	8
20	16	45	4	70	43	95	27	120	45	147	4
21	12	46	10	71	17	96	32	121	32	148	2
22	10	47	16	72	26	97	39	122	10	149	6
23	13	48	24	73	32	98	57	123	2	150	6
24	16	49	34	74	40	99	42	125	12	151	8
25	25	50	24	75	43	100	18	127	10	152	5
26	22	51	34	76	18	101	14	128	5	154	4
27	24	52	49	77	19	102	8	129	8	155	2
28	28	53	41	78	22	103	3	130	24	156	4
29	23	54	20	79	20	104	14	131	80	157	12
30	26	55	32	80	17	105	6	132	26	158	2
31	26	56	36	81	29	106	6	133	12	159	2
32	42	57	40	82	24	107	2	134	22	160	4
										161	4
										162	1
										163	2
										165	2
										166	6
										167	4
										169	2
										171	2

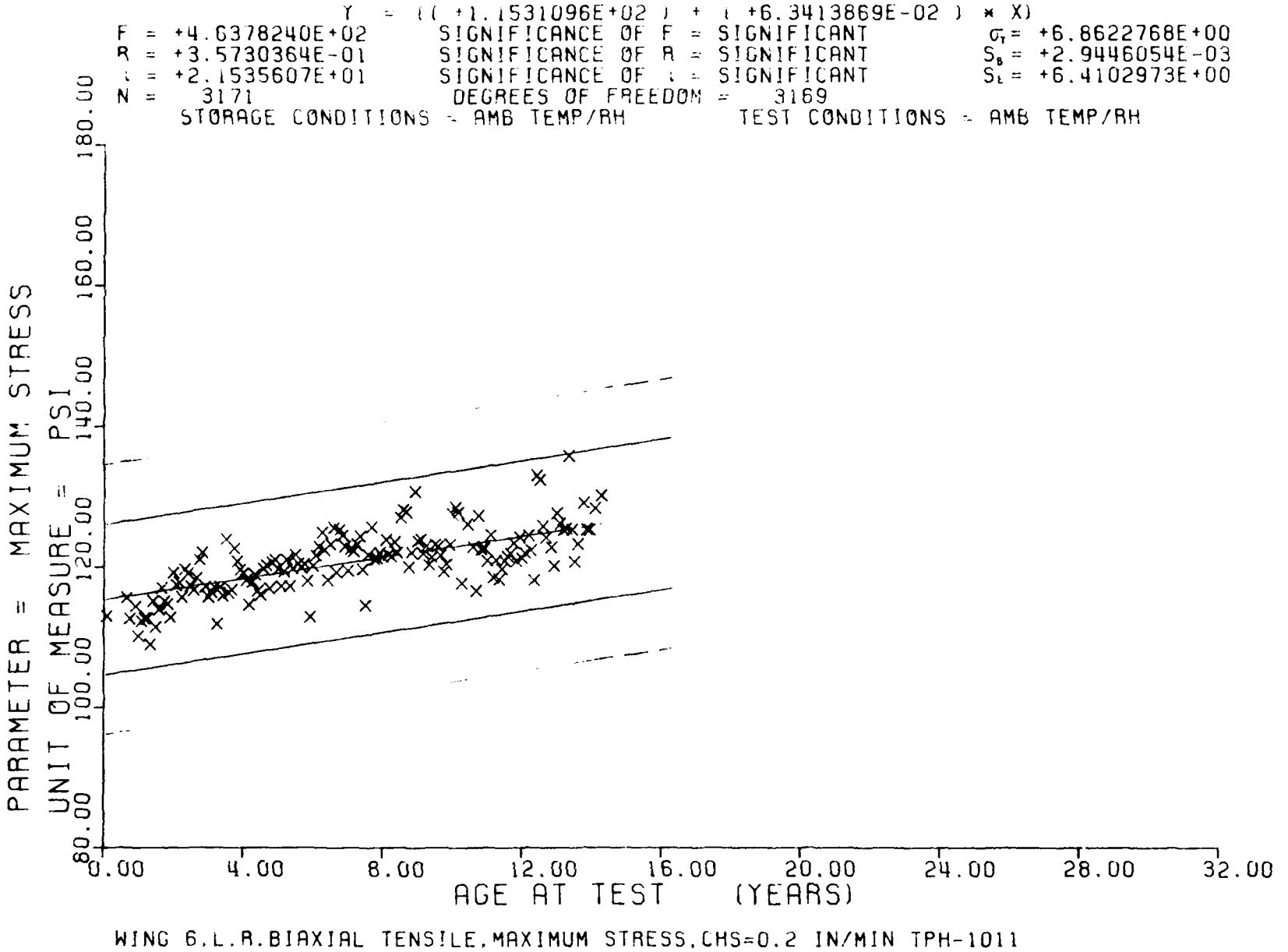
WING 6,L.R.BIAXIAL TENSILE,STRAIN AT MAX STRESS,CHS=0.2 IN/MIN TPH-1011

This sample size summary is applicable to figures 6 thru 9



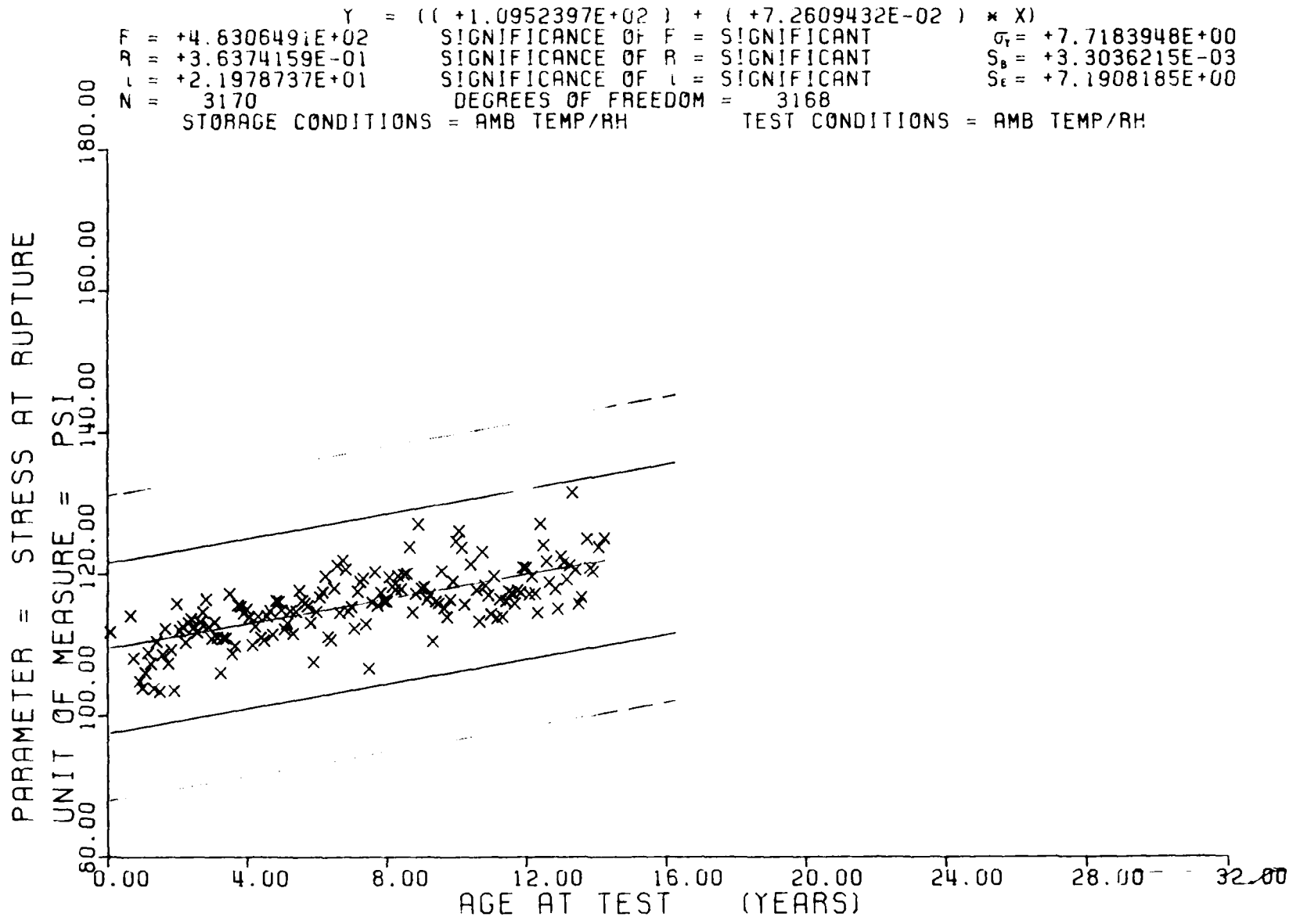
WING 6,L.R.BIAXIAL TENSILE,STRAIN AT MAX STRESS,CHS=0.2 IN/MIN TPH-1011

Figure 6



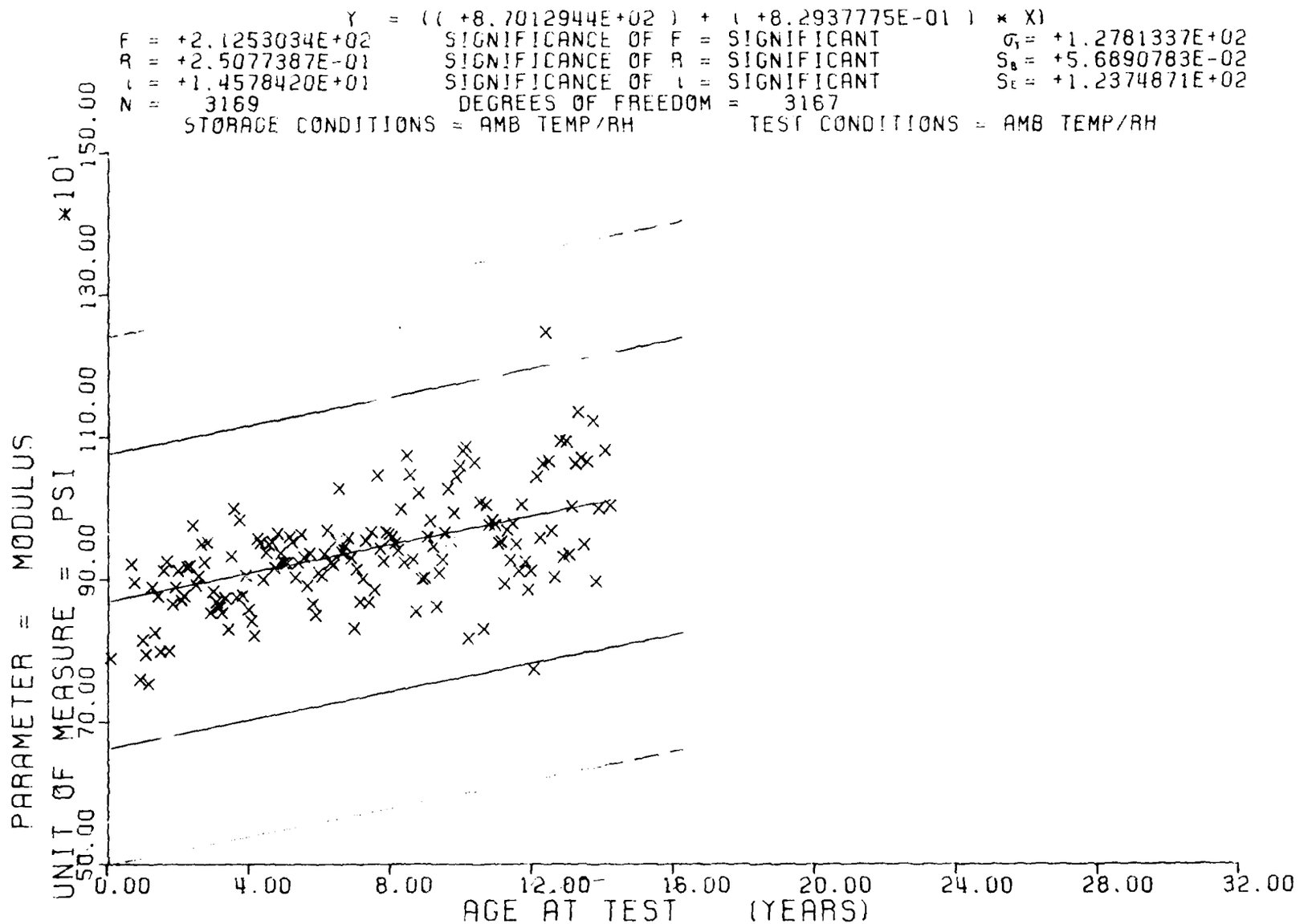
WING 6.L.R.BIAXIAL TENSILE,MAXIMUM STRESS,CHS=0.2 IN/MIN TPH-1011

Figure 7



WING 6,L.R.BIAXIAL TENSILE,STRESS AT RUPTURE,CHS=0.2 IN/MIN TPH-1011

Figure 8



WING 6.L.R.BIAXIAL TENSILE.MODULUS.CHS=0.2 IN/MIN TPH-1011

Figure 9

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
2	3	28	82	53	97	78	177	103	53	128	74
4	57	29	55	54	83	79	129	104	81	129	51
5	151	30	52	55	143	80	131	105	18	130	264
6	191	31	52	56	108	81	179	106	15	131	150
7	171	32	124	57	172	82	94	107	27	132	55
8	143	33	85	58	158	83	100	108	111	133	69
9	194	34	76	59	134	84	75	109	109	134	111
10	139	35	44	60	159	85	83	110	62	135	47
11	132	36	154	61	189	86	60	111	33	136	45
12	220	37	83	62	218	87	153	112	105	137	102
13	213	38	39	63	283	88	143	113	129	138	267
14	222	39	93	64	134	89	150	114	82	139	159
15	223	40	65	65	75	90	117	115	77	140	43
16	212	41	35	66	61	91	94	116	282	141	44
17	184	42	69	67	104	92	80	117	264	142	84
18	26	43	75	68	110	93	81	118	161	143	229
19	57	44	21	69	154	94	131	119	117	144	30
20	18	45	20	70	188	95	136	120	256	145	24
21	78	46	58	71	102	96	239	121	127	146	42
22	43	47	106	72	157	97	266	122	38	147	21
23	30	48	85	73	162	98	268	123	46	148	18
24	77	49	122	74	196	99	153	124	44	149	23
25	51	50	108	75	259	100	65	125	60	150	38
26	56	51	175	76	161	101	103	126	78	151	29
27	59	52	223	77	154	102	22	127	65	152	15

Age	Nr	Age	Nr
153	6	162	3
154	27	163	3
155	27	164	6
156	25	165	6
157	23	166	24
158	24	167	12
159	21	168	18
160	21	169	3
161	33	171	9

WING 6,L.P.TENSILE,STRESS AT RUPTURE,CHS=2.0 IN/MIN TP-H1011

This sample size summary is applicable to figures 10 thru 14

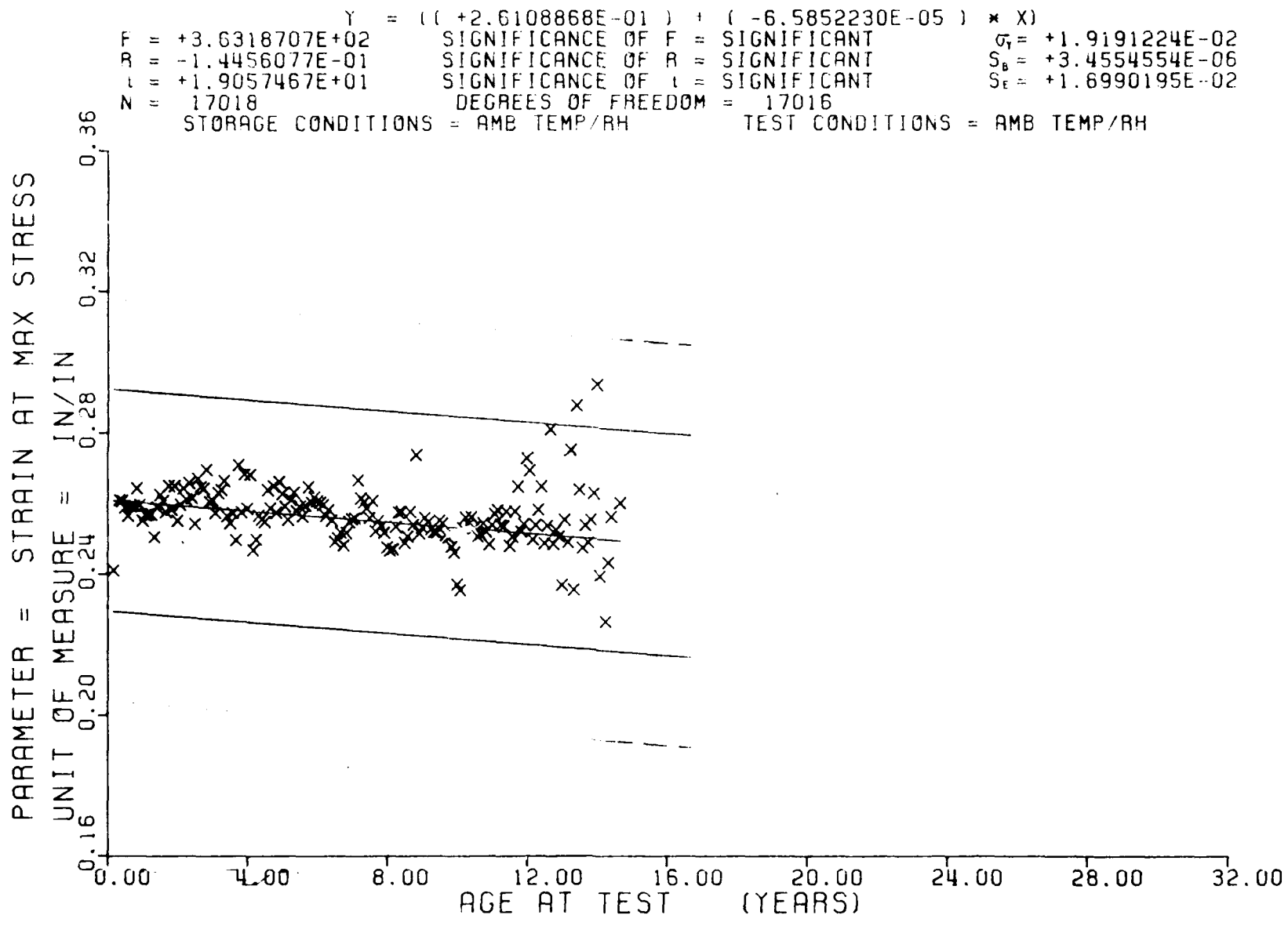
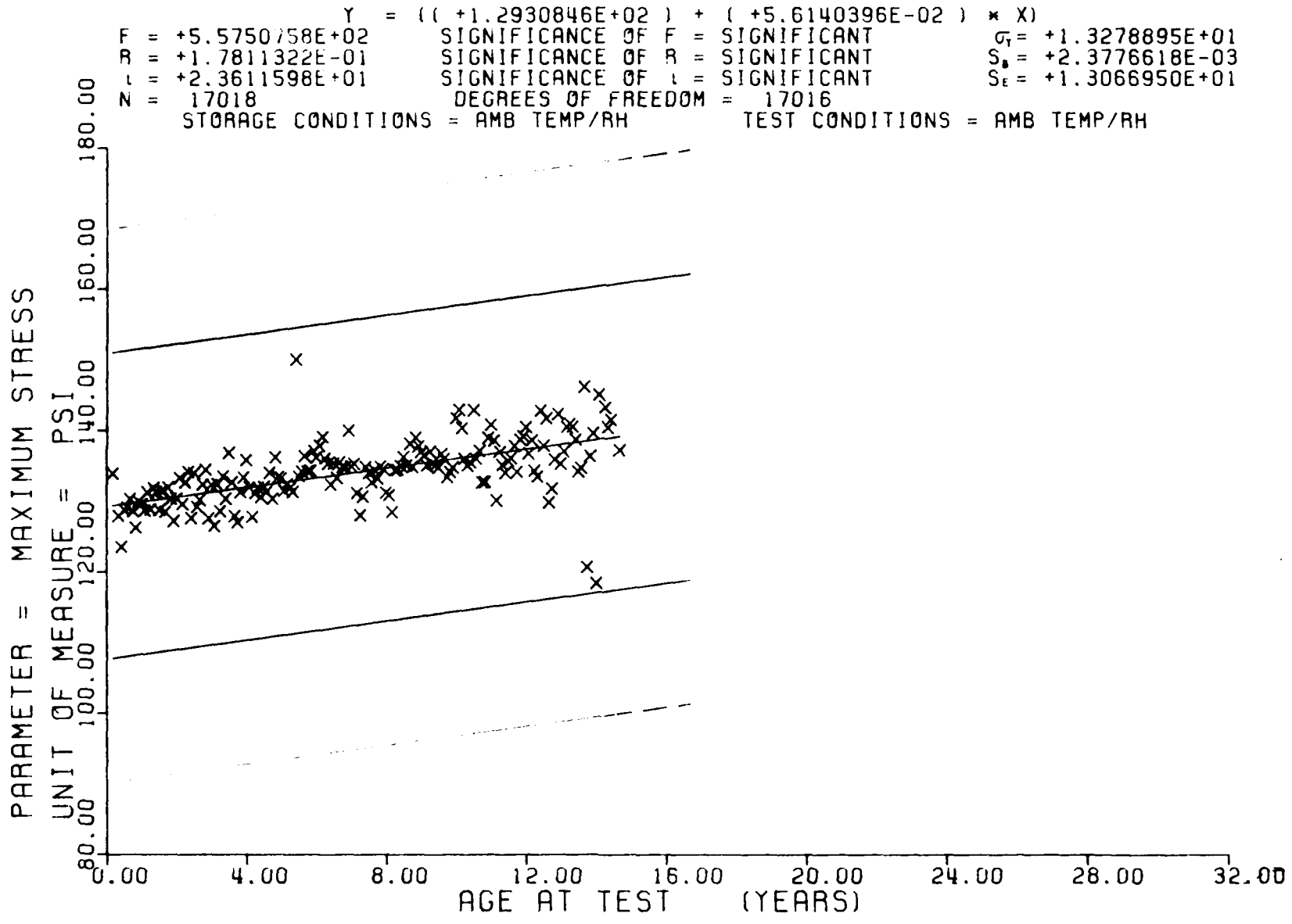

Y = ((+2.6108868E-01) + (-6.5852230E-05) * X)
F = +3.6318707E+02
R = -1.4456077E-01
t = +1.9057467E+01
N = 17018
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 17016
σ1 = +1.9191224E-02
SB = +3.4554554E-06
SE = +1.6990195E-02
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = IN/IN
0.16
0.20
0.24
0.28
0.32
0.36
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6,L.R.TENSILE,STRAIN AT MAX STRESS,CHS=2.0 IN/MIN TP-H1011

Figure 10



WING 6.L.R.TENSILE,MAXIMUM STRESS,CHS=2.0 IN/MIN TP-H1011

Figure 11

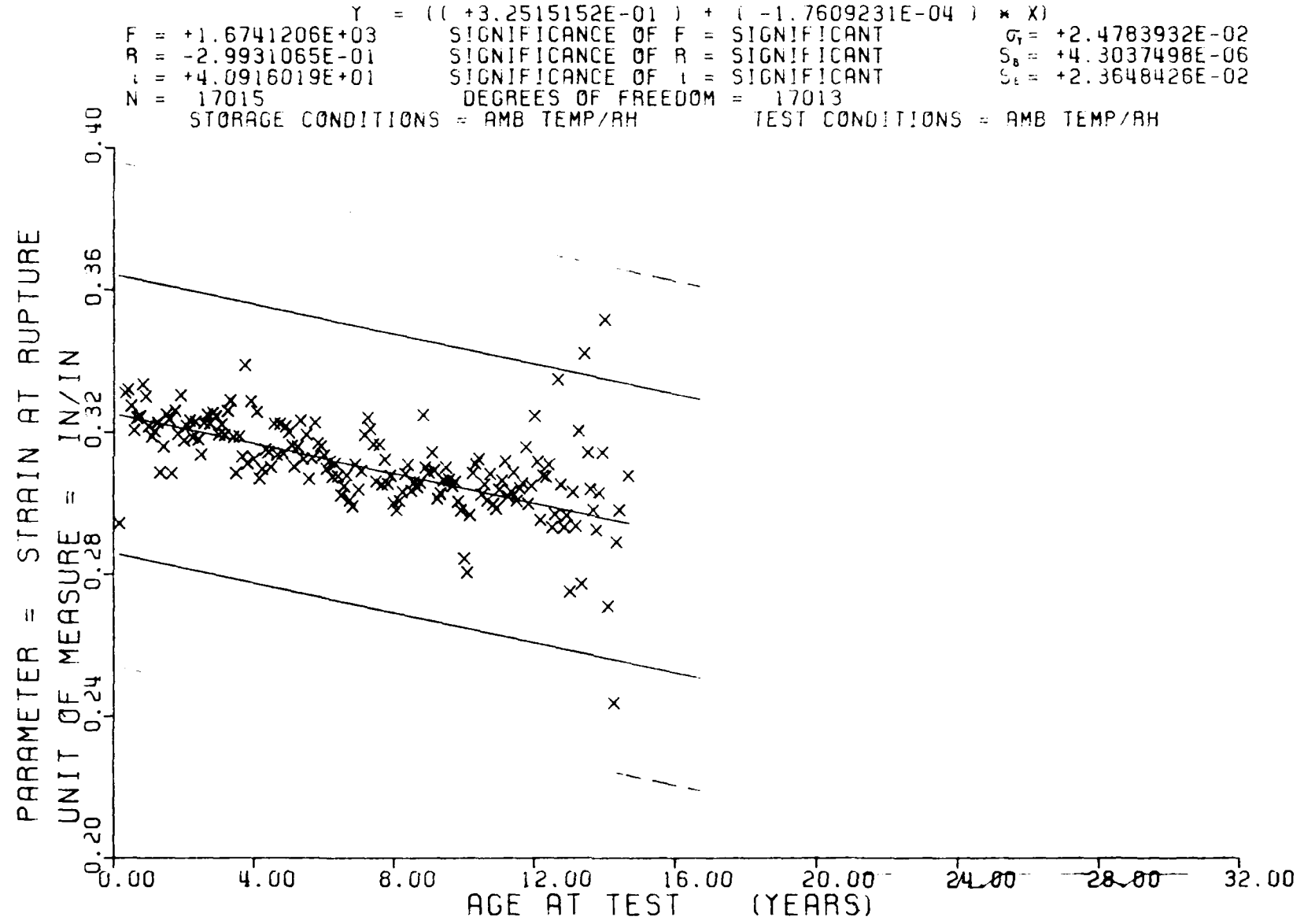

Y = ((+3.2515152E-01) + (-1.7609231E-04) * X)
F = +1.6741206E+03 SIGNIFICANCE OF F = SIGNIFICANT σT = +2.4783932E-02
R = -2.9931065E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +4.3037498E-06
t = +4.0916019E+01 SIGNIFICANCE OF t = SIGNIFICANT Se = +2.3648426E-02
N = 17015 DEGREES OF FREEDOM = 17013
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = IN/IN
0.40
0.36
0.32
0.28
0.24
0.20
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6.L.R.TENSILE,STRAIN AT RUPTURE,CHS=2.0 IN/MIN TP-H1011

Figure 12

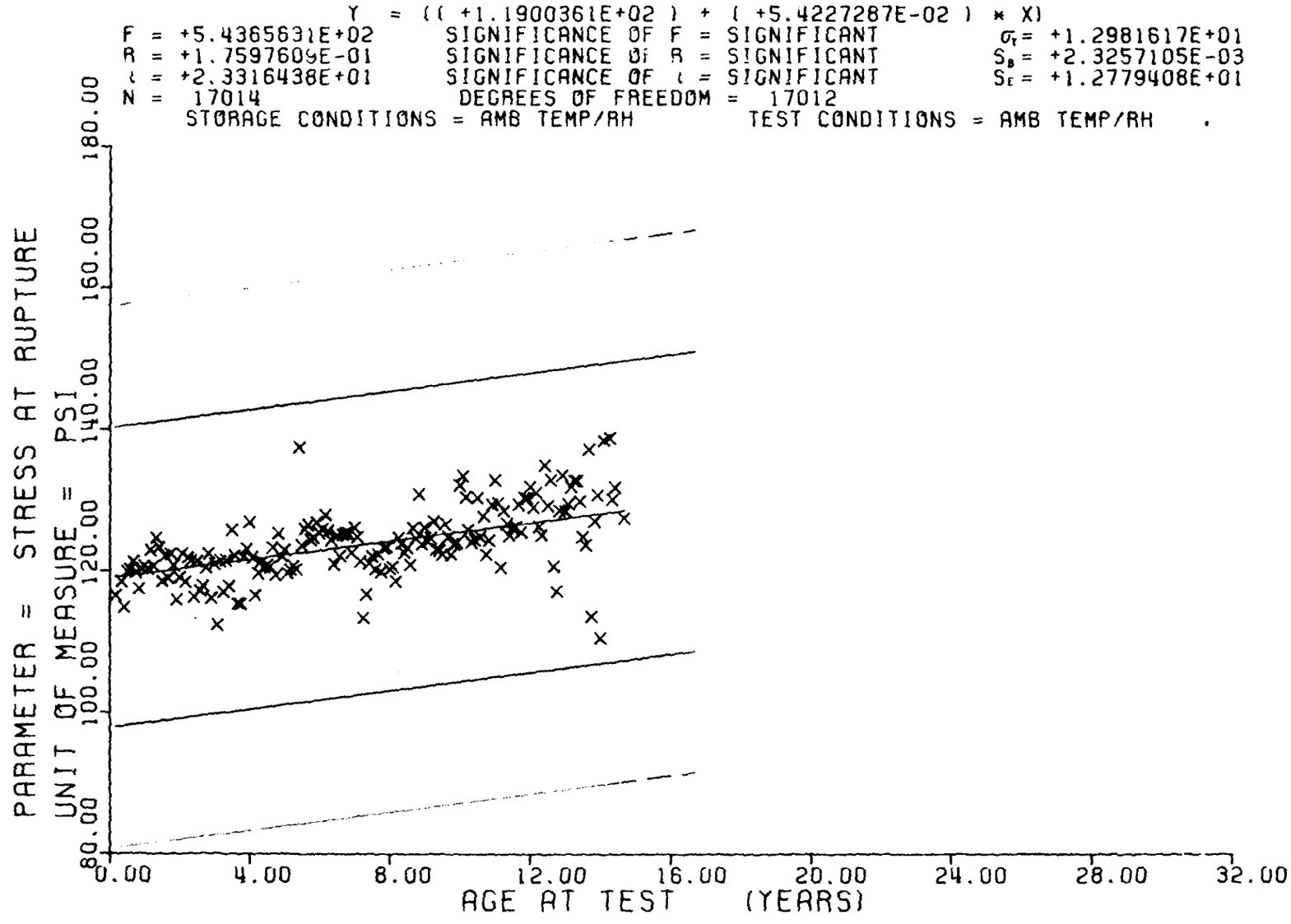

Y = ((+1.1900361E+02) + (+5.4227287E-02) * X)
F = +5.4365631E+02 SIGNIFICANCE OF F = SIGNIFICANT σr = +1.2981617E+01
R = +1.7597609E-01 SIGNIFICANCE OF R = SIGNIFICANT SB = +2.3257105E-03
ι = +2.3316438E+01 SIGNIFICANCE OF ι = SIGNIFICANT SE = +1.2779408E+01
N = 17014 DEGREES OF FREEDOM = 17012
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRESS AT RUPTURE
UNIT OF MEASURE = PSI
80.00
100.00
120.00
140.00
160.00
180.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6,L.R.TENSILE,STRESS AT RUPTURE,CHS=2.0 IN/MIN TP-H1011

Figure 13

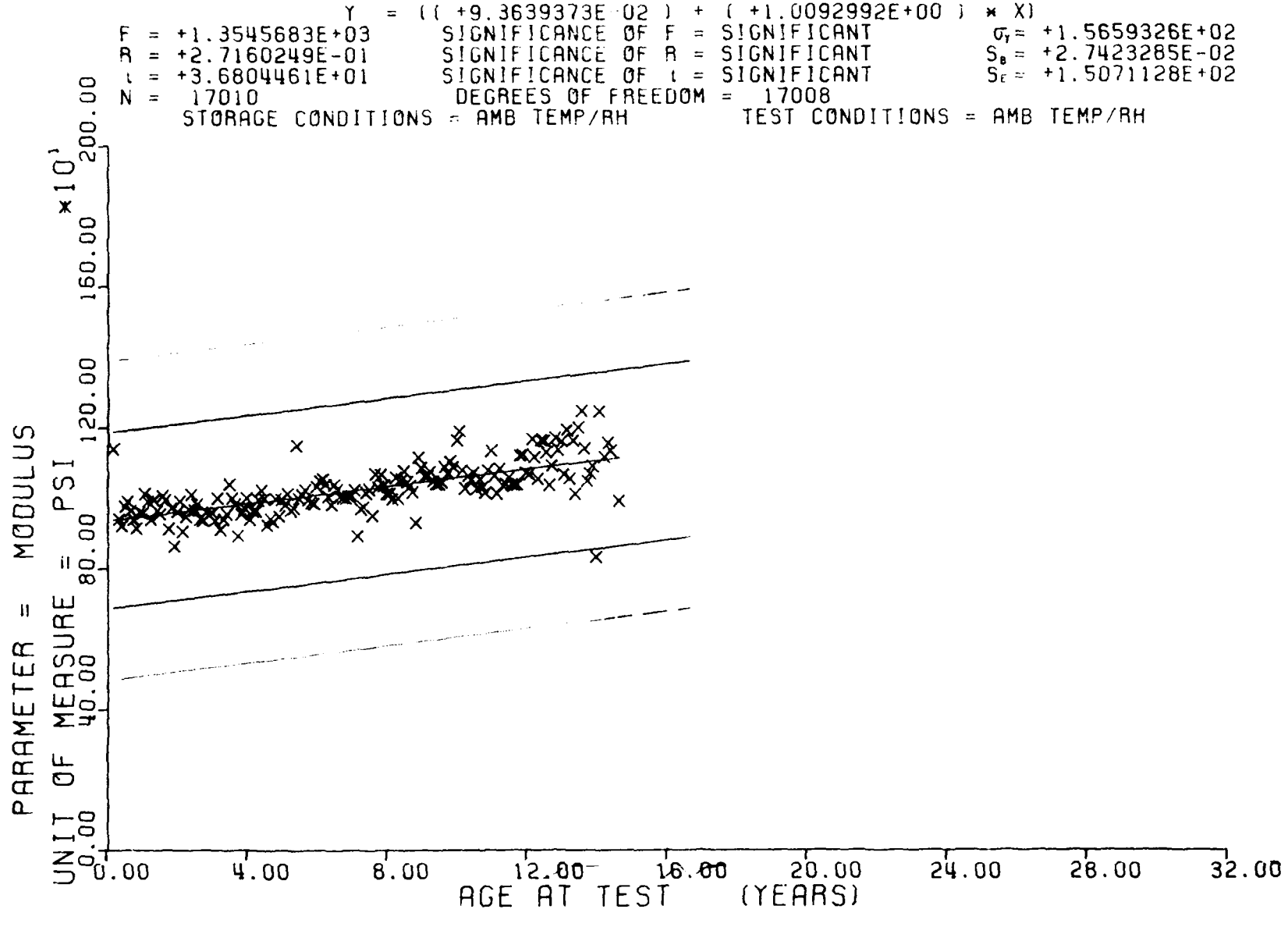

Y = ((+9.3639373E 02) + (+1.0092992E+00) * X)
F = +1.3545683E+03 SIGNIFICANCE OF F = SIGNIFICANT σY = +1.5659326E+02
R = +2.7160249E-01 SIGNIFICANCE OF R = SIGNIFICANT Sβ = +2.7423285E-02
t = +3.6804461E+01 SIGNIFICANCE OF t = SIGNIFICANT SE = +1.5071128E+02
N = 17010 DEGREES OF FREEDOM = 17008
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
UNIT OF MEASURE = PSI *10¹
PARAMETER = MODULUS
0.00
40.00
80.00
120.00
160.00
200.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6.L.R.TENSILE.MODULUS.CHS=2.0 IN/MIN TP-H1011

Figure 14

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	2	33	23	58	30	83	9	108	8	134	18
8	2	34	22	59	27	84	8	109	21	135	15
9	4	35	24	60	22	85	14	110	34	136	6
11	4	36	26	61	36	86	8	111	8	137	10
12	14	37	16	62	38	87	10	112	8	138	27
13	17	38	11	63	41	88	16	113	24	139	18
14	6	39	25	64	42	89	19	114	49	140	6
15	6	40	10	65	28	90	19	115	55	141	9
16	8	41	8	66	27	91	27	116	59	142	10
17	4	42	6	67	28	92	6	117	42	143	6
18	14	43	2	68	29	93	12	118	23	144	43
19	11	44	4	69	24	94	16	119	21	145	27
20	20	45	2	70	59	95	16	120	41	146	8
21	4	46	6	71	36	96	35	121	8	147	6
22	10	47	18	72	29	97	37	122	13	148	2
23	6	48	9	73	44	98	31	123	11	149	5
24	8	49	34	74	36	99	46	124	2	150	8
25	23	50	34	75	36	100	20	125	8	151	11
26	13	51	24	76	26	101	17	127	8	152	4
27	11	52	42	77	13	102	8	128	8	153	2
28	17	53	42	78	14	103	6	129	4	154	4
29	14	54	14	79	27	104	11	130	19	155	4
30	18	55	30	80	14	105	15	131	18	156	4
31	16	56	22	81	15	106	10	132	47	157	12
32	23	57	30	82	22	107	2	133	30	158	1
										159	4
										160	6
										161	8
										163	2
										165	2
										166	3
										167	4
										168	7
										169	2
										170	3
										171	2
										172	4
										173	2
										175	2
										176	4

WING 6,H.R.TRIAXIAL TENSILE,STRAIN AT MAX STRESS,CHS=1750 IN/MIN,800 PSI

This sample size summary is applicable to figures 15 thru 18

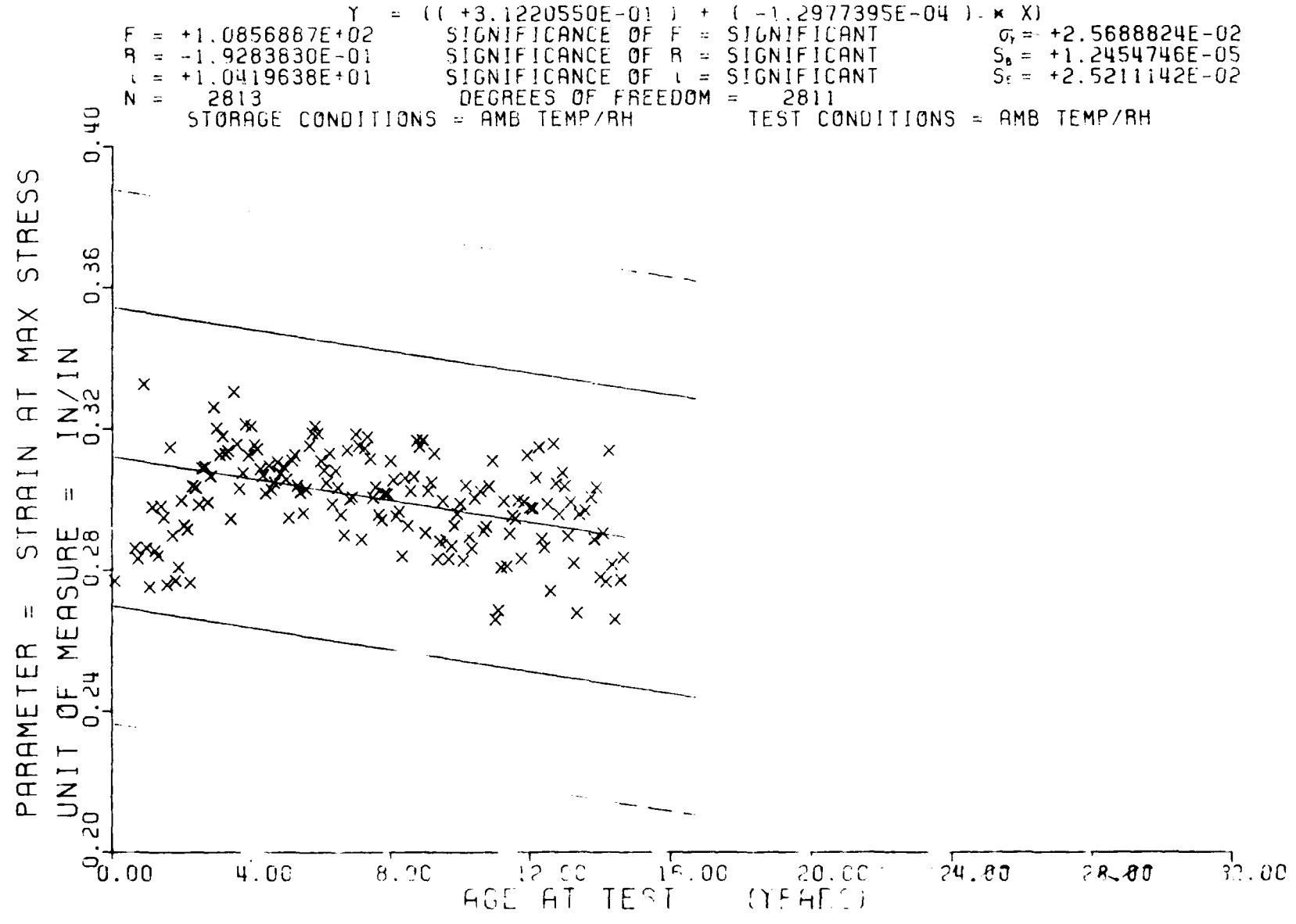
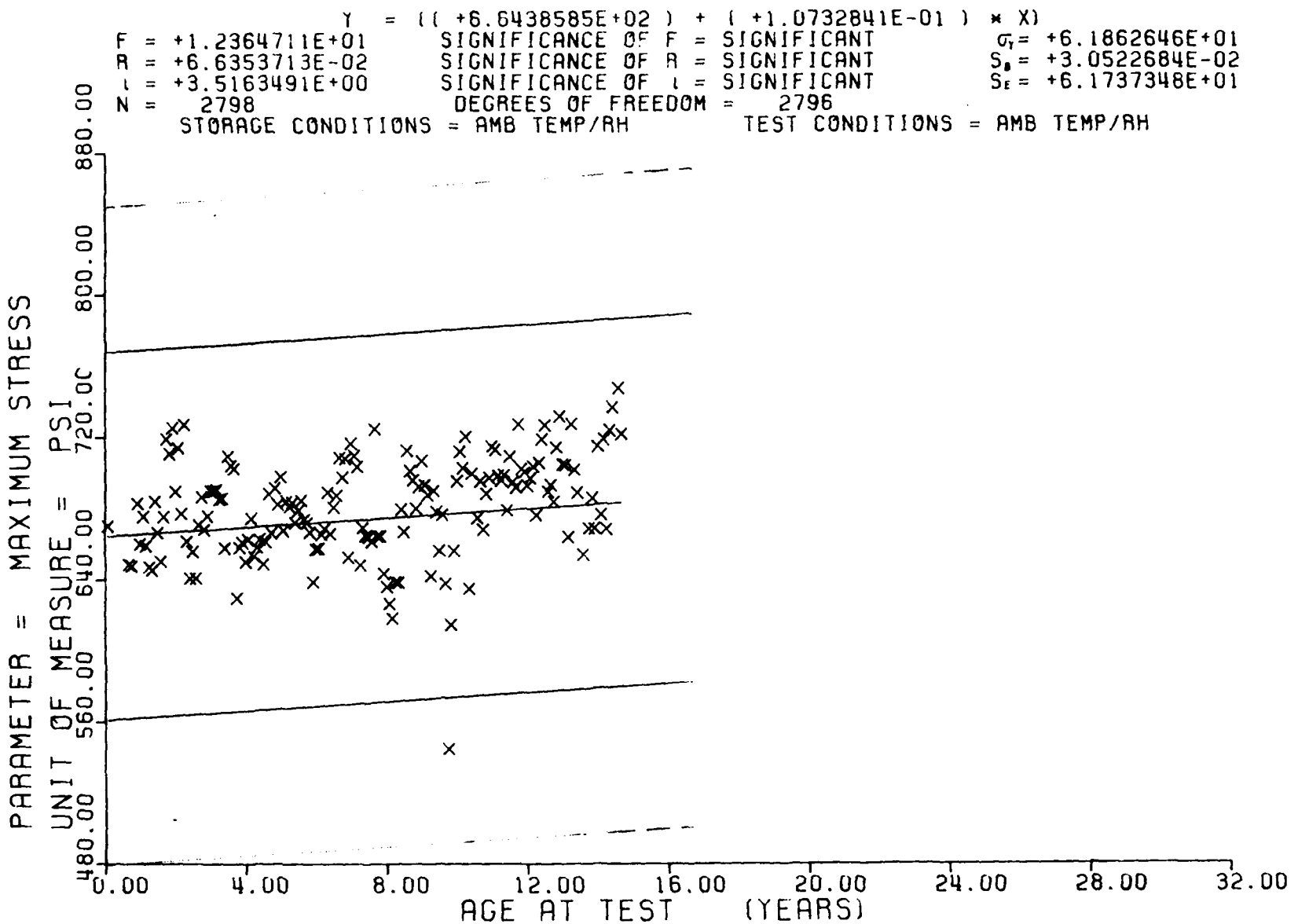
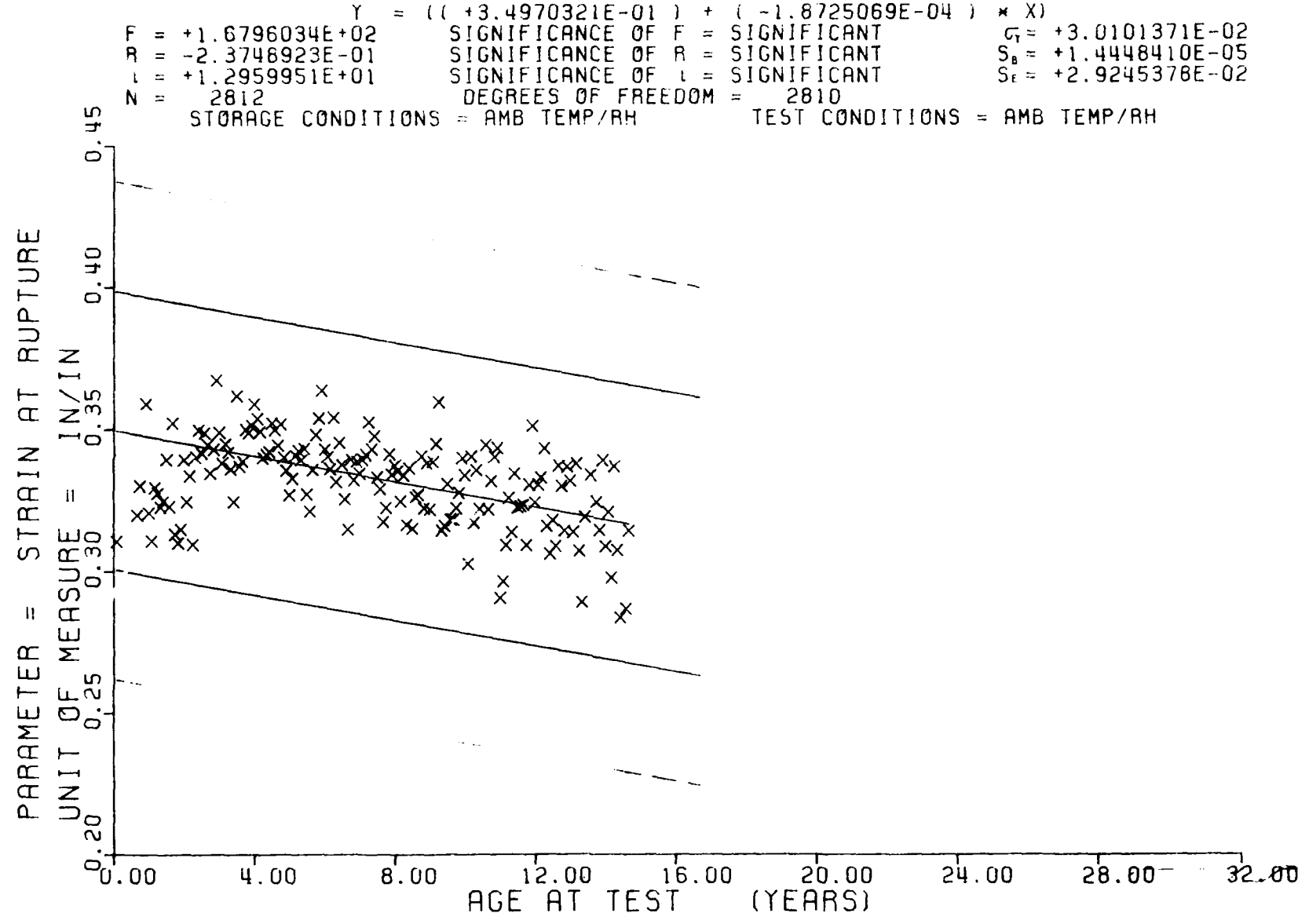

Y = ((+3.1220550E-01) + (-1.2977395E-04) * X)
F = +1.0856887E+02
R = -1.9283830E-01
ι = +1.0419638E+01
N = 2813
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF ι = SIGNIFICANT
DEGREES OF FREEDOM = 2811
σγ = +2.5688824E-02
Sθ = +1.2454746E-05
Sε = +2.5211142E-02
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = IN/IN
0.40
0.36
0.32
0.28
0.24
0.20
0.00
4.00
8.00
20.00
24.00
AGE AT TEST (YEARS)
MIN S.H.R. TRIAXIAL TENSILE. STRAIN AT MAX STRESS. CHS=1750 IN/MIN 800 PSI

Figure 15



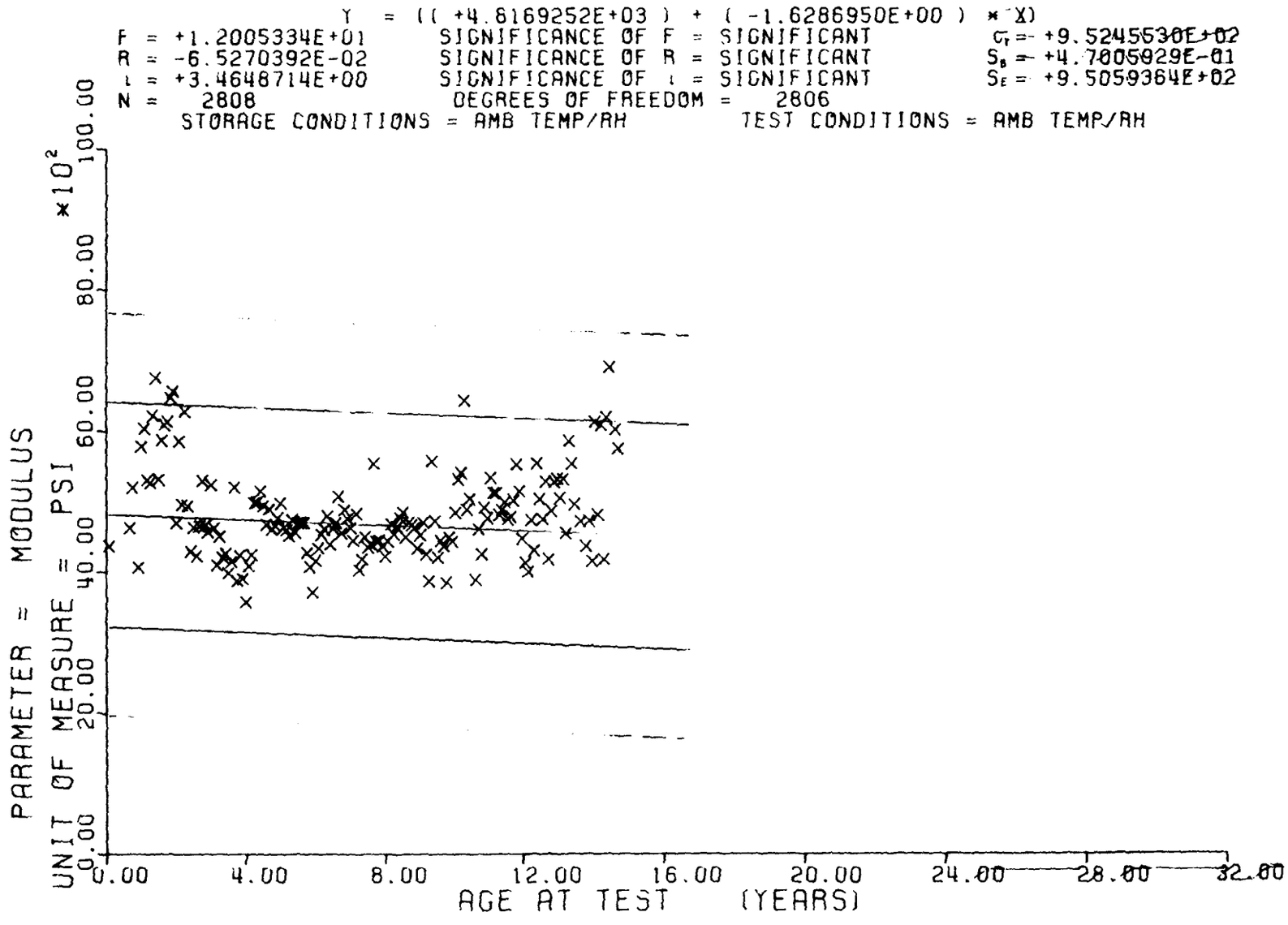
WING 6,M.A.TRIAXIAL TENSILE,MAXIMUM STRESS,CHS=1750 IN/MIN, 800 PSI

Figure 16



WING 6,H.R.TRIAXIAL TENSILE,STRAIN AT RUPTURE,CHS=1750 IN/MIN, 800 PSI

Figure 17



WING 6,H.R.TRIAXIAL TENSILE.MODULUS.CHS=1750 IN/MIN AT 800 PSI

Figure 18

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
[illegible]	[illegible]	35	7	60	38	85	15	110	40	135	13
11	12	36	26	61	45	86	11	111	17	136	10
12	12	37	26	62	68	87	27	112	12	137	23
13	13	38	24	63	120	88	23	113	85	138	51
14	4	39	34	64	43	89	46	114	57	139	65
15	12	40	11	65	41	90	50	115	31	140	8
16	8	41	21	66	16	91	30	116	34	141	14
17	12	42	7	67	22	92	18	117	122	142	10
18	14	43	7	68	48	93	28	118	31	143	8
19	4	44	12	69	47	94	31	119	34	144	21
20	4	45	5	70	49	95	21	120	48	145	14
21	24	46	9	71	40	96	29	121	27	146	40
22	4	47	10	72	46	97	34	122	6	147	20
23	2	48	4	73	81	98	33	123	21	148	7
24	16	49	28	74	63	99	17	124	14	149	9
25	24	50	26	75	51	100	16	125	34	150	8
26	12	51	57	76	29	101	23	126	16	151	4
27	31	52	100	77	19	102	9	127	26	152	4
28	20	53	49	78	30	103	7	128	28	153	4
29	37	54	16	79	63	104	24	129	12	154	6
30	23	55	43	80	20	105	9	130	23	155	5
31	29	56	50	81	17	106	11	131	32	156	4
32	42	57	52	82	24	107	12	132	34	157	5
33	24	58	54	83	23	108	12	133	11	158	10
34	21	59	24	84	8	109	23	134	36	159	2
										160	4
										161	8
										162	2
										163	2
										165	2
										166	4
										167	4
										168	2
										169	2
										171	1

WING 6,H.P.HYDROSTATIC,STRAIN AT MAX STRESS,1750 IN/MIN,800 PSI

This sample size summary is applicable to figures 19 thru 23

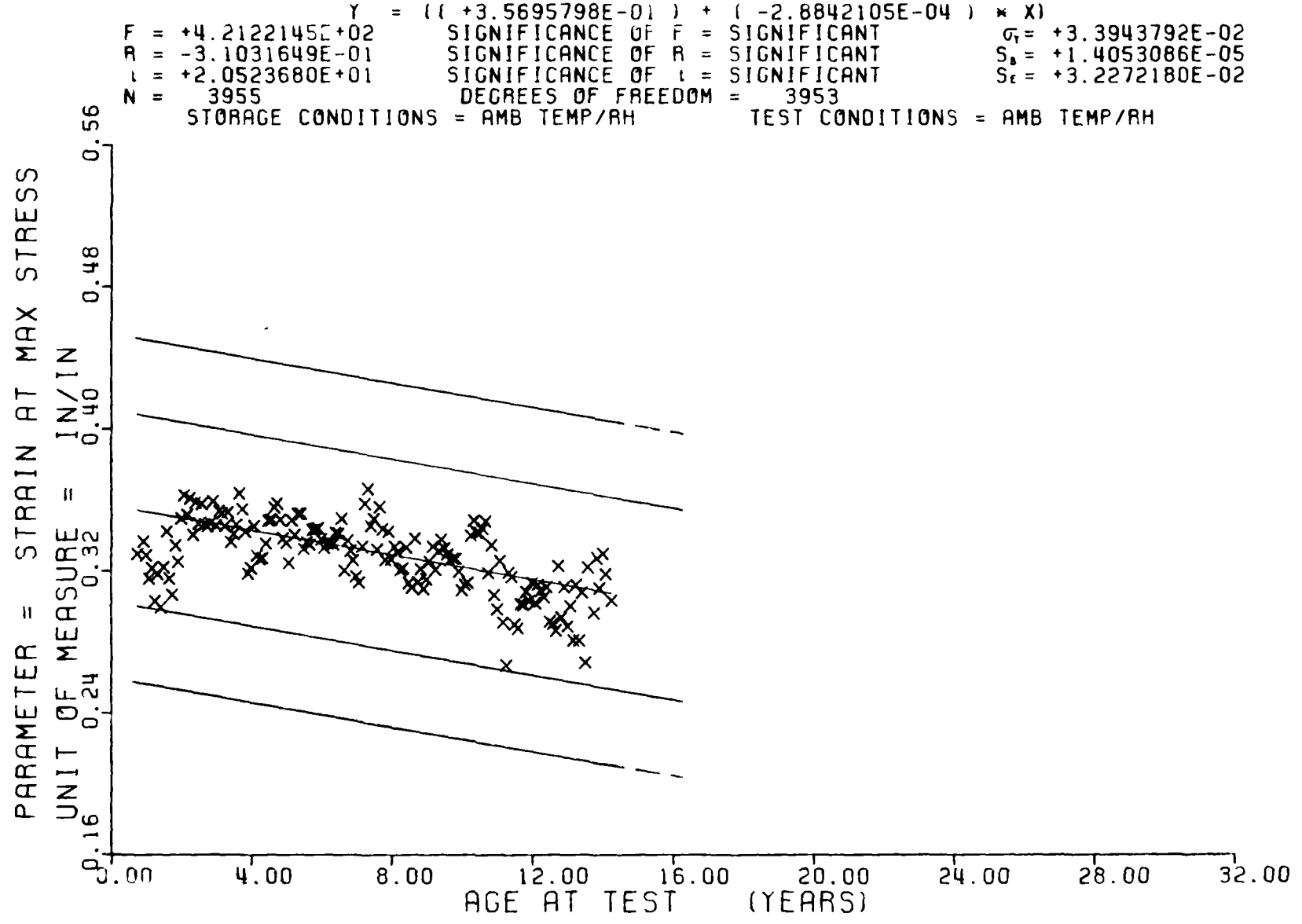

Y = ((+3.5695798E-01) + (-2.8842105E-04) * X)
F = +4.2122145E+02 SIGNIFICANCE OF F = SIGNIFICANT σT = +3.3943792E-02
R = -3.1031649E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +1.4053086E-05
t = +2.0523680E+01 SIGNIFICANCE OF t = SIGNIFICANT Sε = +3.2272180E-02
N = 3955 DEGREES OF FREEDOM = 3953
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = IN/IN
0.16
0.24
0.32
0.40
0.48
0.56
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6.H.R.HYDROSTATIC.STRAIN AT MAX STRESS.1750IN/MIN.800 PSI

Figure 19

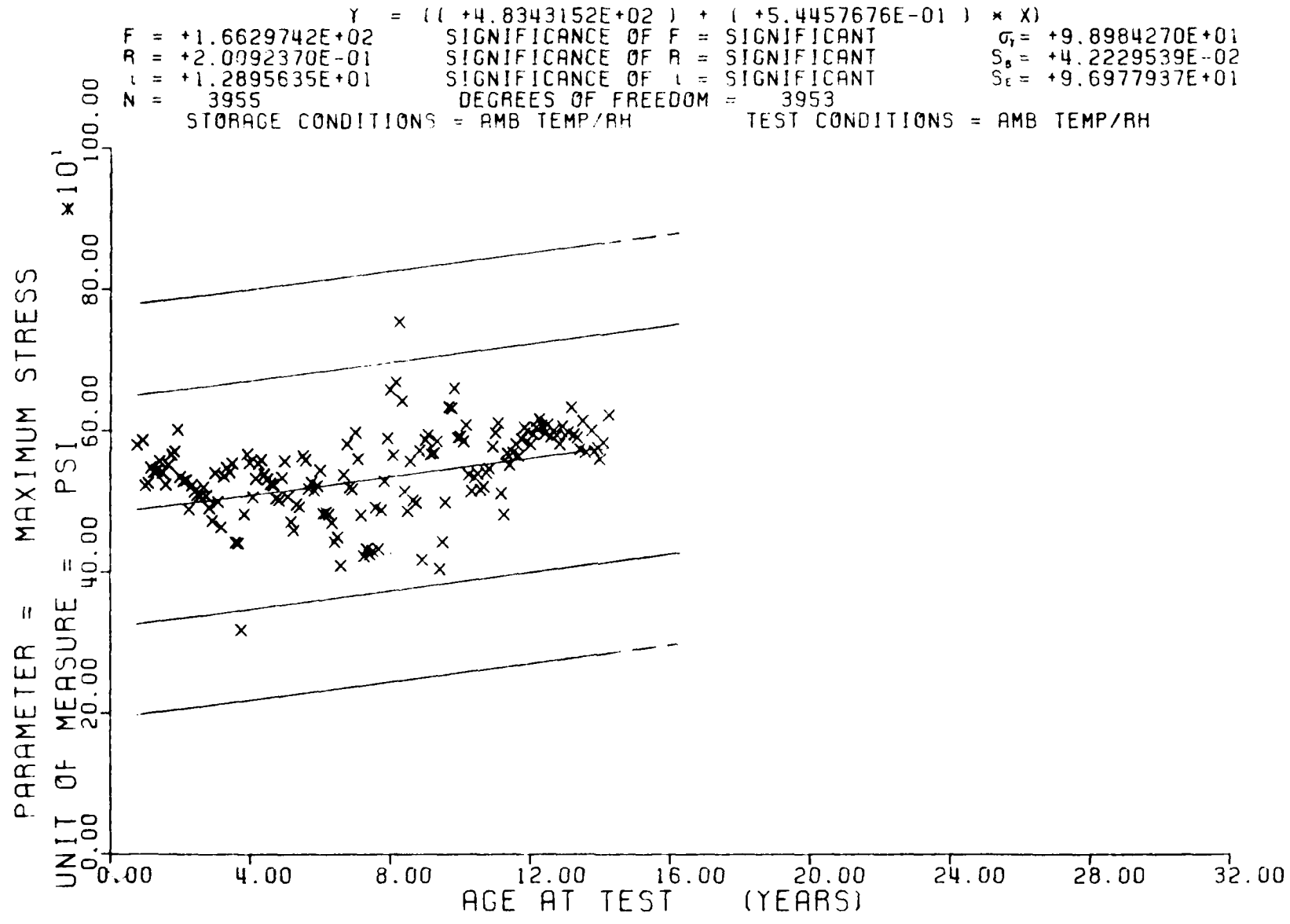

Y = ((+4.8343152E+02) + (+5.4457676E-01) × X)
F = +1.6629742E+02 SIGNIFICANCE OF F = SIGNIFICANT σ = +9.8984270E+01
R = +2.0092370E-01 SIGNIFICANCE OF R = SIGNIFICANT S = +4.2229539E-02
t = +1.2895635E+01 SIGNIFICANCE OF t = SIGNIFICANT S = +9.6977937E+01
N = 3955 DEGREES OF FREEDOM = 3953
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI ×10¹
0.00
20.00
40.00
60.00
80.00
100.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6.H.R.HYDROSTATIC,MAXIMUM STRESS.175OIN/MIN,800 PSI

Figure 20

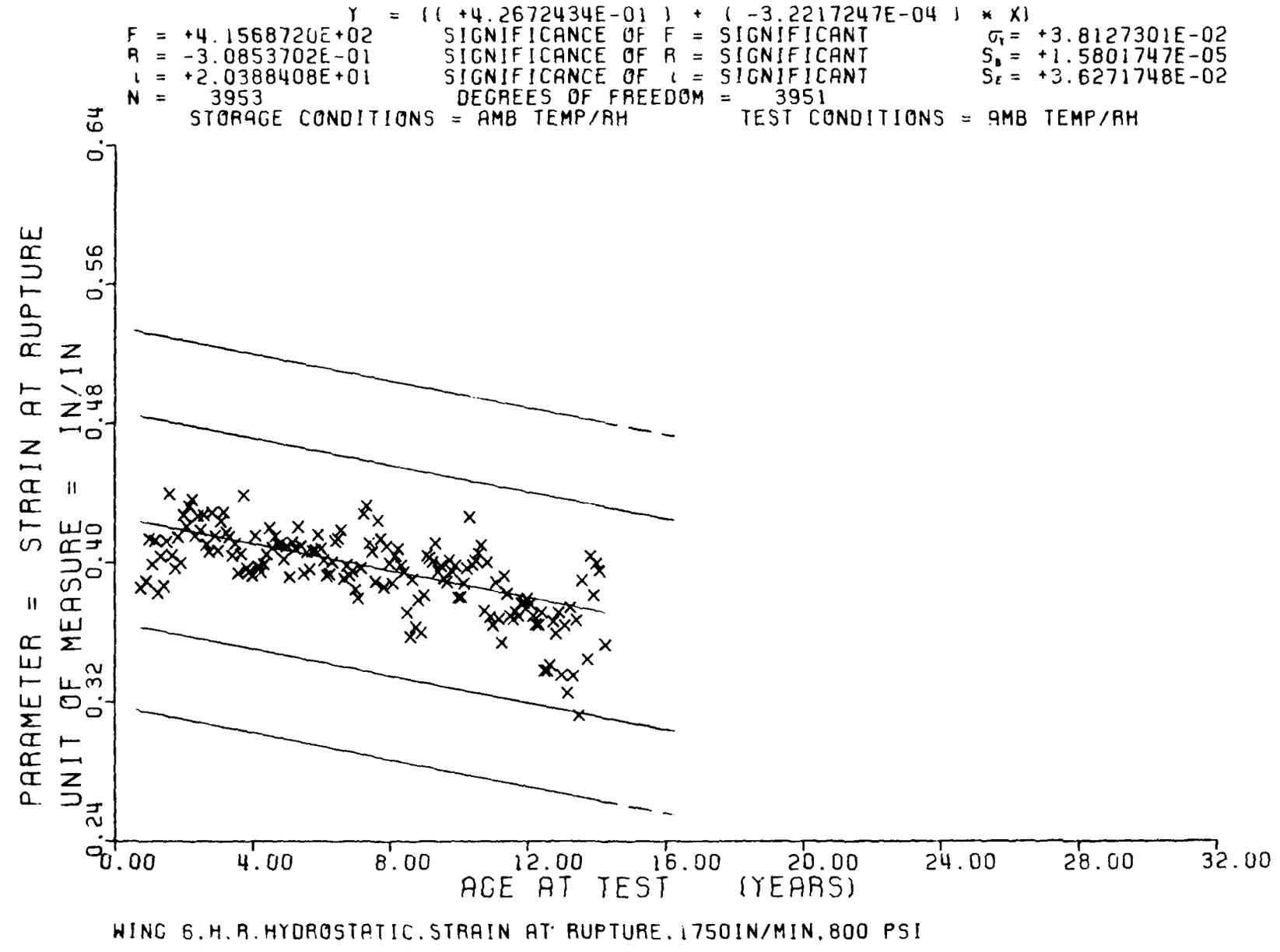
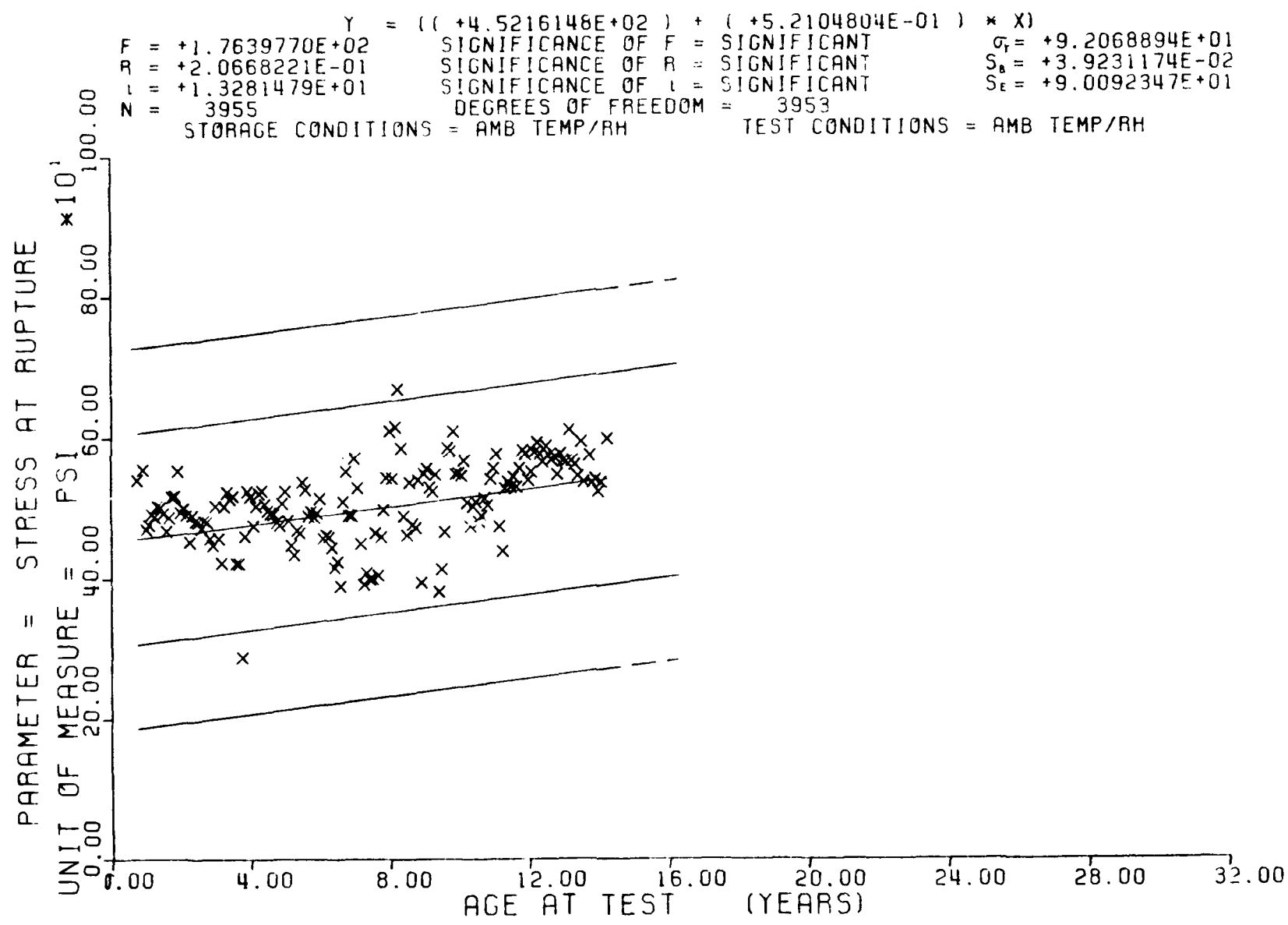

Y = ((+4.2672434E-01) + (-3.2217247E-04) * X)
F = +4.1568720E+02 SIGNIFICANCE OF F = SIGNIFICANT
R = -3.0853702E-01 SIGNIFICANCE OF R = SIGNIFICANT
ι = +2.0388408E+01 SIGNIFICANCE OF ι = SIGNIFICANT
N = 3953 DEGREES OF FREEDOM = 3951
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = IN/IN
0.64
0.56
0.48
0.40
0.32
0.24
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6.H.R.HYDROSTATIC.STRAIN AT RUPTURE.1750IN/MIN.800 PSI

Figure 21



WING 6.H.R.HYDROSTATIC.STRESS AT RUPTURE.1750IN/MIN.800 PSI

Figure 22

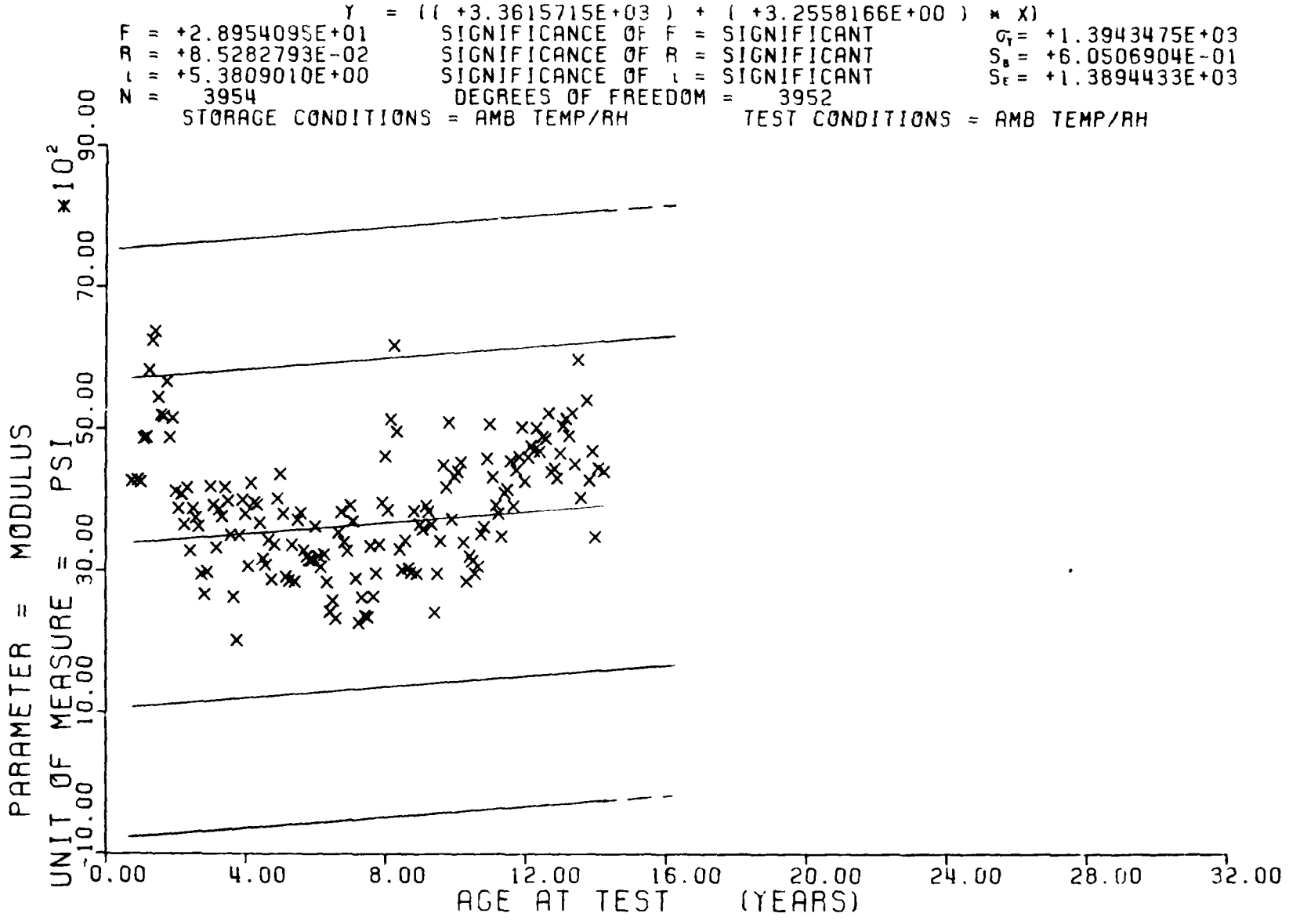

Y = ((+3.3615715E+03) + (+3.2558166E+00) * X)
F = +2.8954095E+01 SIGNIFICANCE OF F = SIGNIFICANT σT = +1.3943475E+03
R = +8.5282793E-02 SIGNIFICANCE OF R = SIGNIFICANT Sb = +6.0506904E-01
ι = +5.3809010E+00 SIGNIFICANCE OF ι = SIGNIFICANT Sε = +1.3894433E+03
N = 3954 DEGREES OF FREEDOM = 3952
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI *10²
90.00
70.00
50.00
30.00
10.00
-10.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6.H.R.HYDROSTATIC.MODULUS.1750 IN/MIN. 800 PSI

Figure 23

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	N SAMP
25	13
31	12
35	11
56	5
57	13
59	14
65	12
91	7
94	14
120	12
121	12

STAGE 1 WING 6 TP-H1011 TEAR ENERGY TEST/TEMP=77 DEG F

This sample size summary is applicable to figure 24

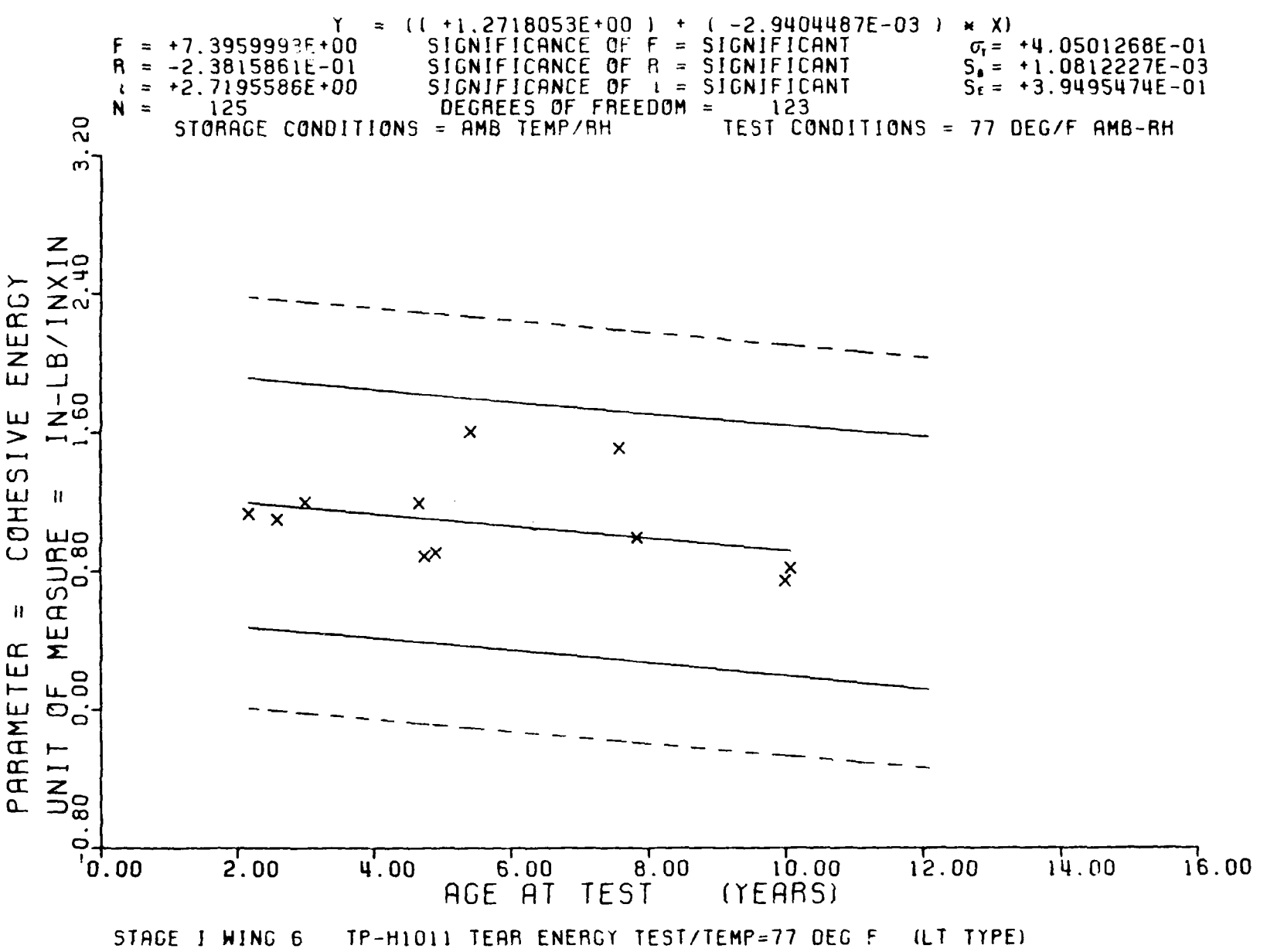

Y = ((+1.2718053E+00) + (-2.9404487E-03) * X)
F = +7.3959993E+00 SIGNIFICANCE OF F = SIGNIFICANT σ1 = +4.0501268E-01
R = -2.3815861E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +1.0812227E-03
ι = +2.7195586E+00 SIGNIFICANCE OF ι = SIGNIFICANT Sε = +3.9495474E-01
N = 125 DEGREES OF FREEDOM = 123
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG/F AMB-RH
PARAMETER = COHESIVE ENERGY
UNIT OF MEASURE = IN-LB/INXIN
3.20
2.40
1.60
0.80
0.00
-0.80
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STAGE I WING 6 TP-H1011 TEAR ENERGY TEST/TEMP=77 DEG F (LT TYPE)

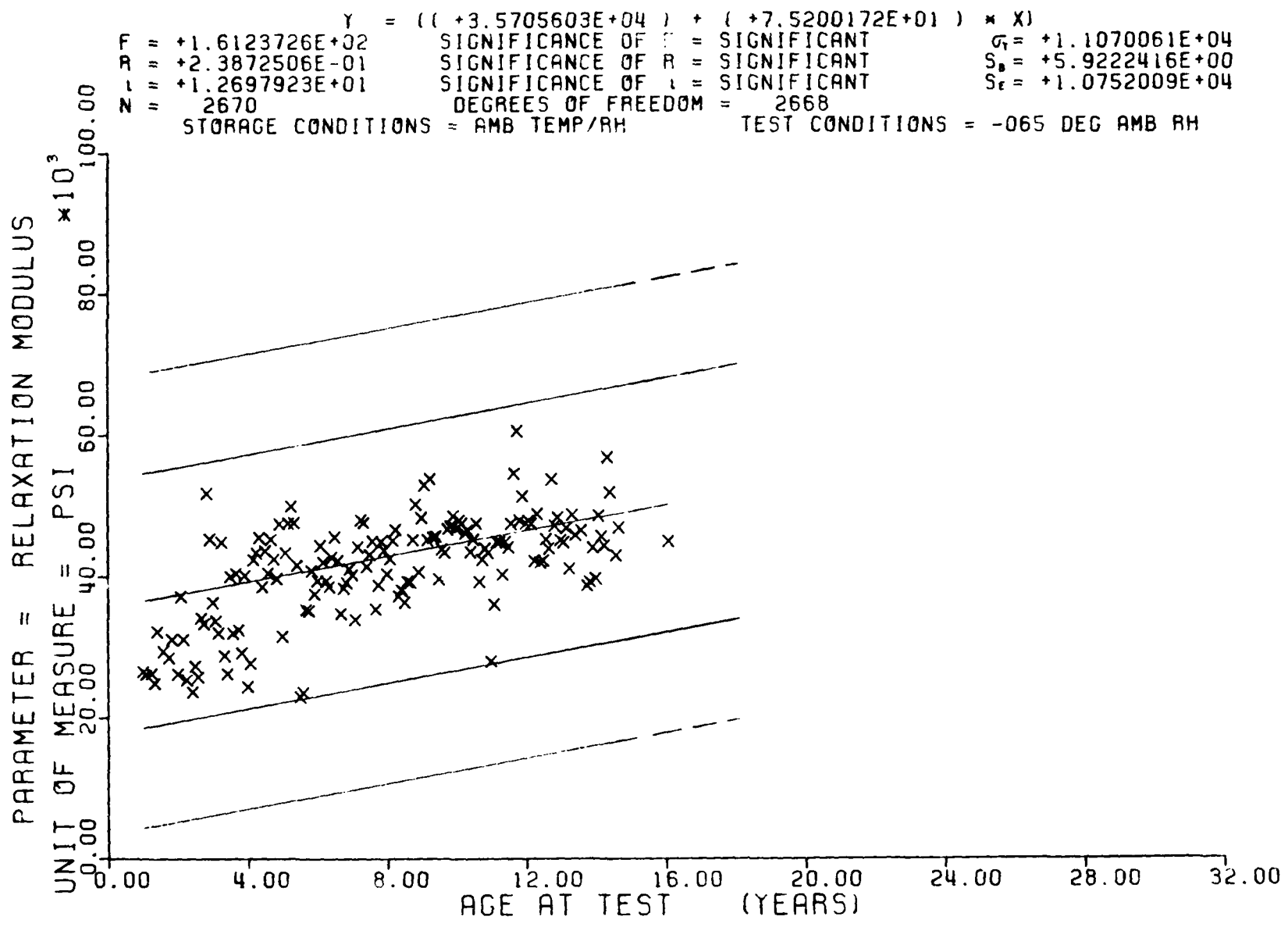
Figure 24

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
12	2	42	6	67	9	92	9	117	27	142	21
13	2	43	12	68	9	93	29	118	21	143	41
14	1	44	3	69	20	94	26	119	19	144	12
15	3	45	6	70	30	95	26	120	42	145	6
17	4	46	3	71	41	96	51	121	21	146	6
19	3	47	6	72	30	97	54	122	6	147	12
21	4	48	6	73	39	98	55	123	9	148	3
22	3	49	2	74	32	99	41	124	27	149	12
24	6	50	26	75	32	100	23	125	20	150	3
25	6	51	49	76	17	101	27	126	21	151	15
26	4	52	46	77	40	102	8	127	18	152	9
27	3	53	18	78	28	103	18	128	23	153	32
29	3	54	27	79	15	104	12	129	2	154	9
30	3	55	27	80	17	105	9	130	36	155	9
31	3	56	21	81	23	106	9	131	42	156	9
32	6	57	24	82	35	107	12	132	8	157	9
33	6	58	20	83	12	108	15	133	21	158	6
34	3	59	9	84	17	109	18	134	31	159	6
35	6	60	9	85	18	110	12	135	21	160	9
36	19	61	21	86	9	111	6	136	2	161	15
37	9	62	46	87	33	112	20	137	12	163	3
38	6	63	23	88	19	113	51	138	37	165	3
39	5	64	30	89	21	114	35	139	48	166	6
40	3	65	9	90	30	115	49	140	9	167	12
41	6	66	2	91	14	116	42	141	15	168	3
										169	3
										170	6
										171	9
										172	3
										173	3
										175	3
										176	6
										193	3
										226	3

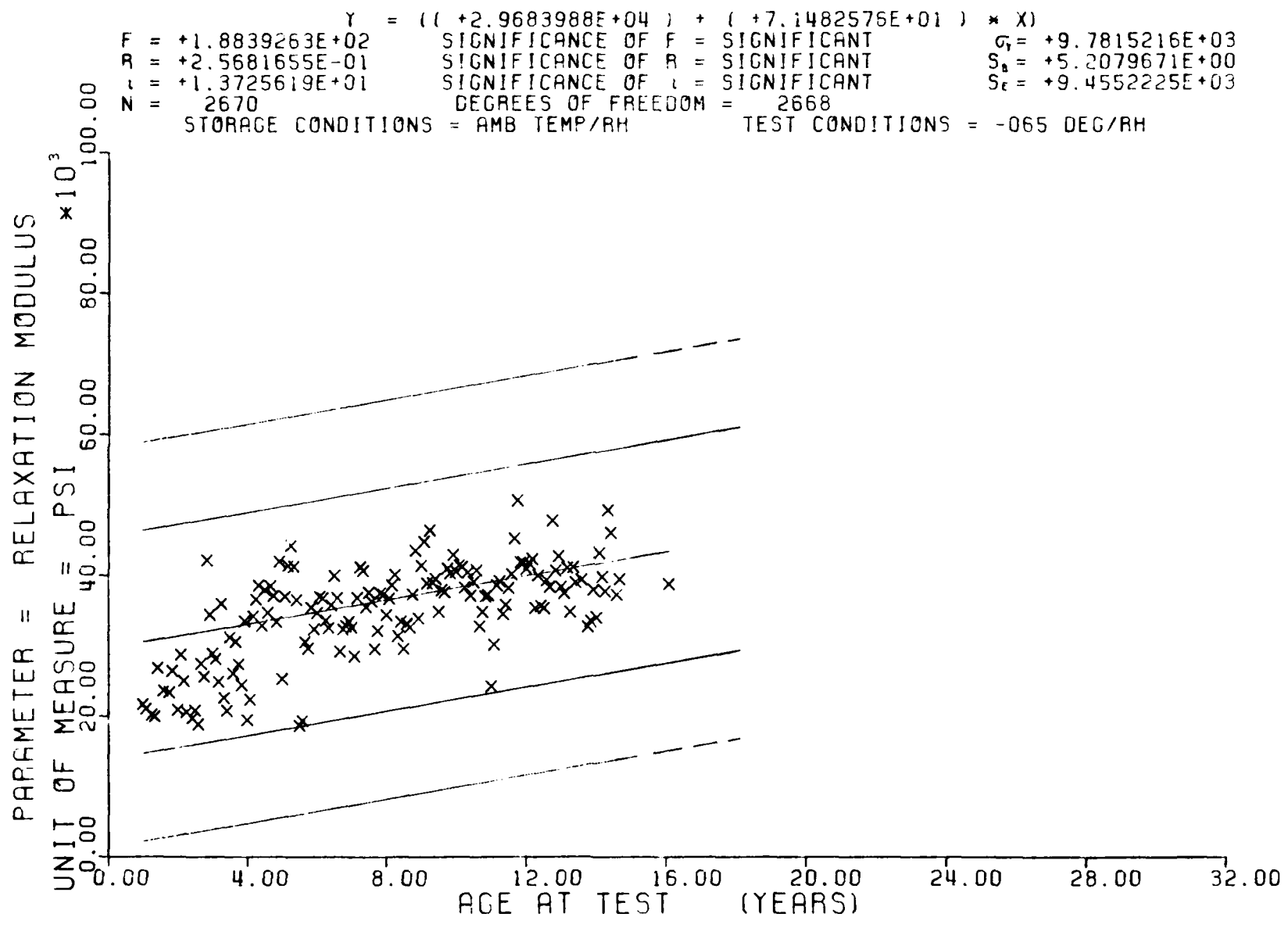
WING C,STRESS RELAXATION MODULUS,0.5% STRAIN,10 SEC.-65 DEG F,TPH-1011

This sample size summary is applicable to figures 25 and 26



WING 6.STRESS RELAXATION MODULUS.0.5% STRAIN.10 SEC.-65 DEG F.TPH-1011

Figure 25



WING 6.STRESS RELAXATION MODULUS,0.5% STRAIN,50 SEC.,-65 DEG F,TPH-1011

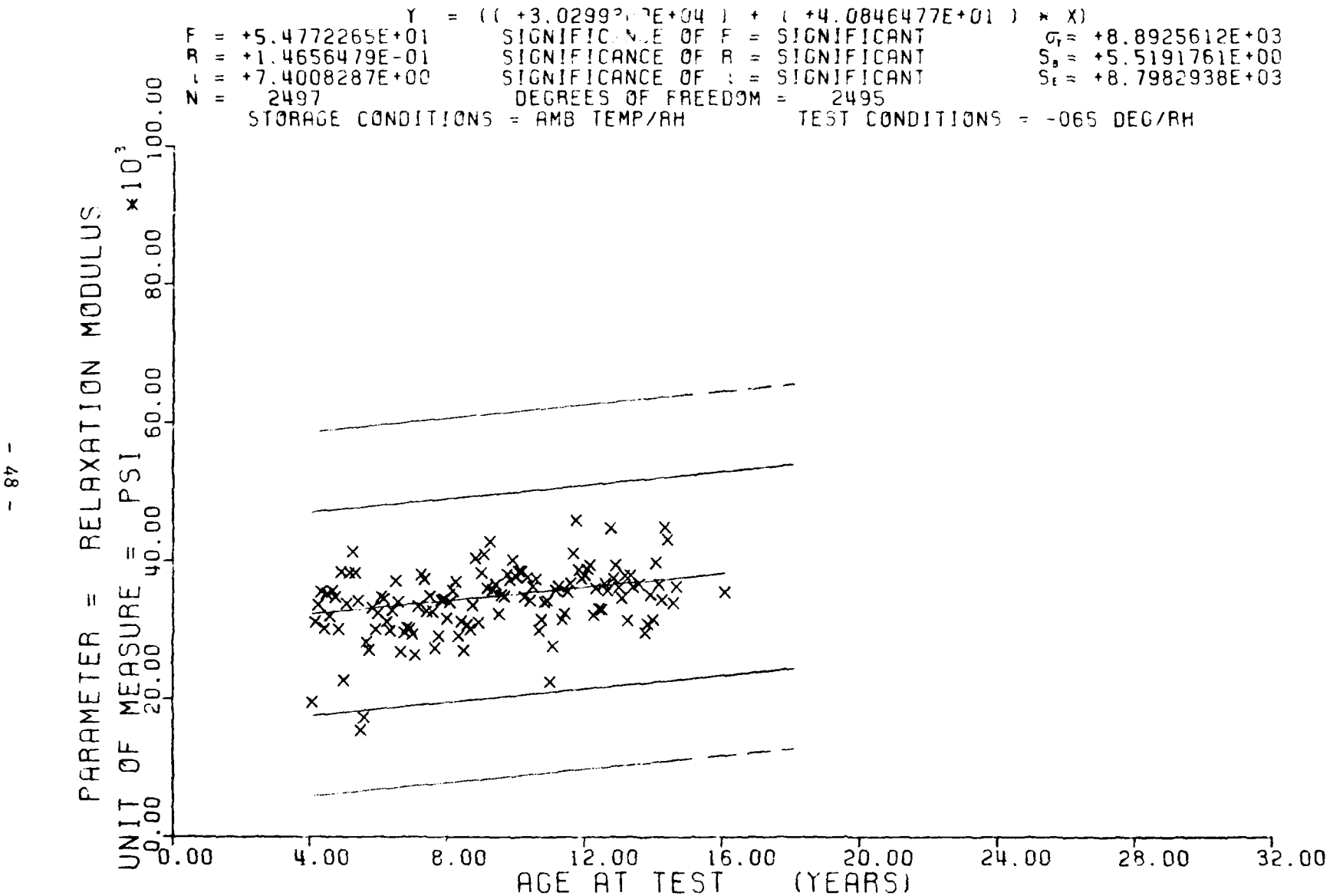
Figure 26

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
[illegible]	[illegible]	74	32	99	41	124	27	149	12	193	3
[illegible]	[illegible]	75	32	100	25	125	20	150	3	226	3
51	[illegible]	76	17	101	27	126	21	151	15		
52	[illegible]	77	40	102	8	127	18	152	9		
53	[illegible]	78	24	103	18	128	23	153	32		
54	27	79	15	104	12	129	2	154	9		
55	27	80	17	105	9	130	36	155	9		
[illegible]	21	81	23	106	9	131	42	156	9		
57	24	82	35	107	12	132	8	157	9		
[illegible]	20	83	12	108	15	133	21	158	6		
[illegible]	[illegible]	84	17	109	18	134	31	159	6		
60	9	85	18	110	12	135	21	160	9		
61	21	86	9	111	6	136	2	161	15		
62	[illegible]	87	33	112	20	137	12	163	3		
63	23	88	19	113	51	138	37	165	3		
64	30	89	21	114	35	139	48	166	6		
65	9	90	30	115	49	140	9	167	12		
66	2	91	14	116	42	141	15	168	3		
67	9	92	9	117	27	142	21	169	3		
68	9	93	25	118	21	143	41	170	6		
69	20	94	26	119	19	144	12	171	9		
70	30	95	26	120	42	145	6	172	3		
71	41	96	51	121	21	146	6	173	3		
72	20	97	54	122	6	147	12	175	3		
73	30	98	55	123	9	148	3	176	6		

WING 6,STRESS RELAXATION MODULUS,0.5% STRAIN,100 SEC,-65 DEG F,TPH-1011

This sample size summary is applicable to figures 27 and 28



WING 6.STRESS RELAXATION MODULUS,0.5% STRAIN,100 SEC,-65 DEG F,TPH-1011

Figure 27

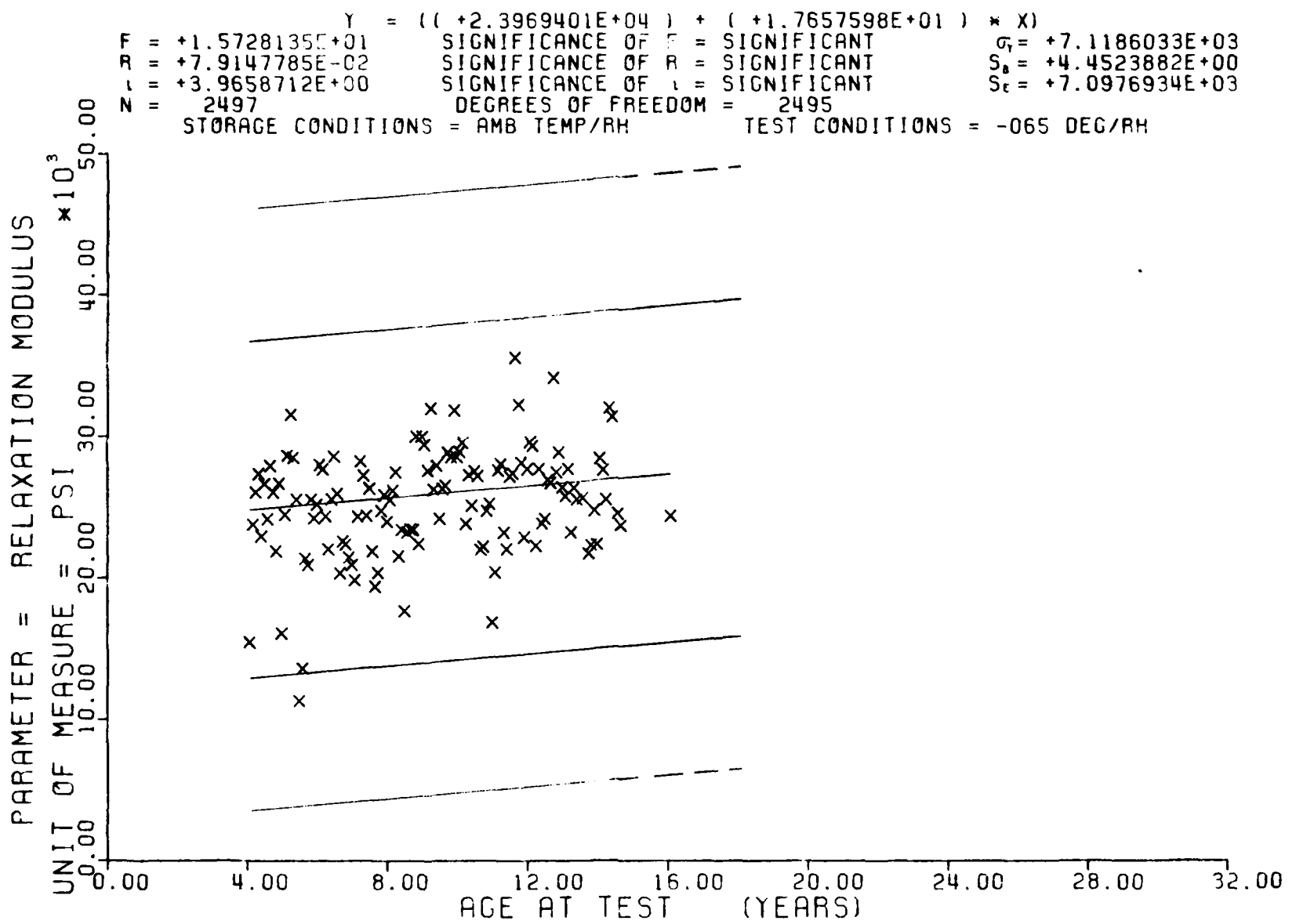

Y = ((+2.3969401E+04) + (+1.7657598E+01) * X)
F = +1.5728135E+01 SIGNIFICANCE OF F = SIGNIFICANT
R = +7.9147785E-02 SIGNIFICANCE OF R = SIGNIFICANT
t = +3.9658712E+00 SIGNIFICANCE OF t = SIGNIFICANT
N = 2497 DEGREES OF FREEDOM = 2495
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = -065 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI *10^3
0.00
10.00
20.00
30.00
40.00
50.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6.STRESS RELAXATION MODULUS,0.5% STRAIN,1000 SEC.-65 DEG F,TPH-1011

Figure 28

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
12	3	41	2	66	6	91	18	116	49	141	15
13	3	42	9	67	6	92	24	117	21	142	30
15	3	43	9	68	12	93	18	118	21	143	40
16	3	44	3	69	21	94	22	119	15	144	9
17	7	45	6	70	30	95	21	120	32	145	6
18	3	46	3	71	44	96	57	121	21	146	3
20	3	47	9	72	36	97	66	122	6	147	12
21	6	48	3	73	35	98	54	123	11	148	3
23	3	49	6	74	34	99	42	124	16	149	12
24	2	50	27	75	28	100	21	125	16	150	3
25	6	51	51	76	29	101	24	126	19	151	15
26	7	52	47	77	36	102	6	127	47	152	6
27	2	53	14	78	35	103	21	128	20	153	6
29	8	54	30	79	15	104	15	129	1	154	9
30	3	55	18	80	19	105	9	130	33	155	6
31	6	56	12	81	24	106	3	131	51	156	9
32	3	57	27	82	33	107	9	132	9	157	9
33	6	58	19	83	9	108	18	133	15	158	6
34	6	59	9	84	24	109	12	134	43	159	6
35	3	60	12	85	21	110	9	135	15	160	9
36	18	61	20	86	15	111	6	136	3	161	15
37	9	62	48	87	30	112	21	137	18	163	3
38	5	63	24	88	23	113	59	138	41	165	3
39	6	64	24	89	21	114	37	139	51	166	6
40	12	65	9	90	29	115	60	140	9	167	6
										168	3
										171	3
										193	3

WING 6,STRESS RELAXATION MODULUS,0.5% STRAIN,10 SEC,-40 DEG F,TPH-1011

This sample size summary is applicable to figures 29 thru 31

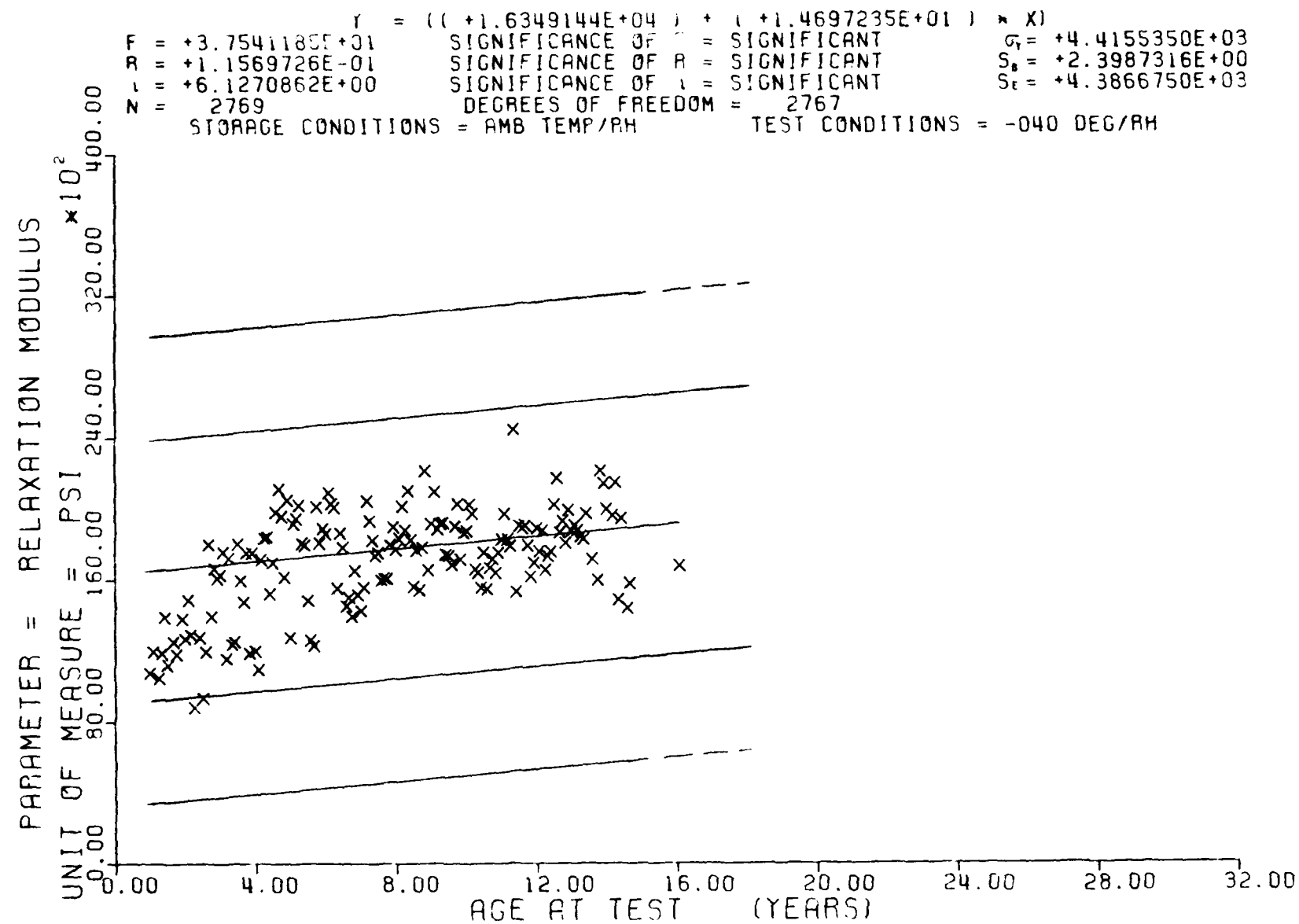
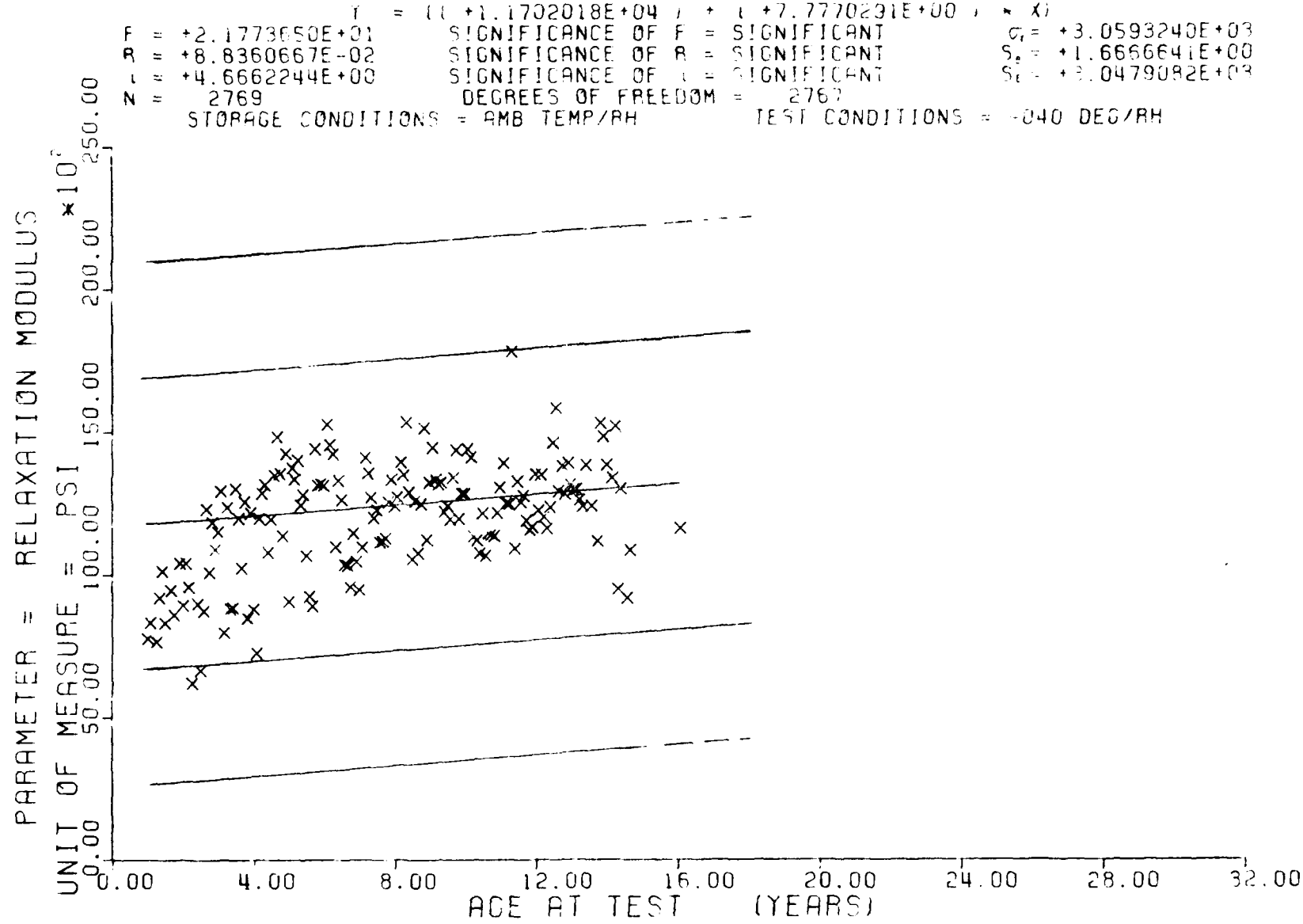

Y = ((+1.6349144E+04) + (+1.4697235E+01) * X)
F = +3.7541185E+01 SIGNIFICANCE OF F = SIGNIFICANT σ = +4.4155350E+03
R = +1.1569726E-01 SIGNIFICANCE OF R = SIGNIFICANT S = +2.3987316E+00
I = +6.1270862E+00 SIGNIFICANCE OF I = SIGNIFICANT S = +4.3866750E+03
N = 2769 DEGREES OF FREEDOM = 2767
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = -040 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI x10²
0.00
80.00
160.00
240.00
320.00
400.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WINC 6.STRESS RELAXATION MODULUS.0.5% STRAIN.10 SEC.-40 DEG F.IPH-1011

Figure 29



WING 6.STRESS RELAXATION MODULUS.0.5% STRAIN.50 SEC.-40 DEG F.IPH-1011

Figure 30

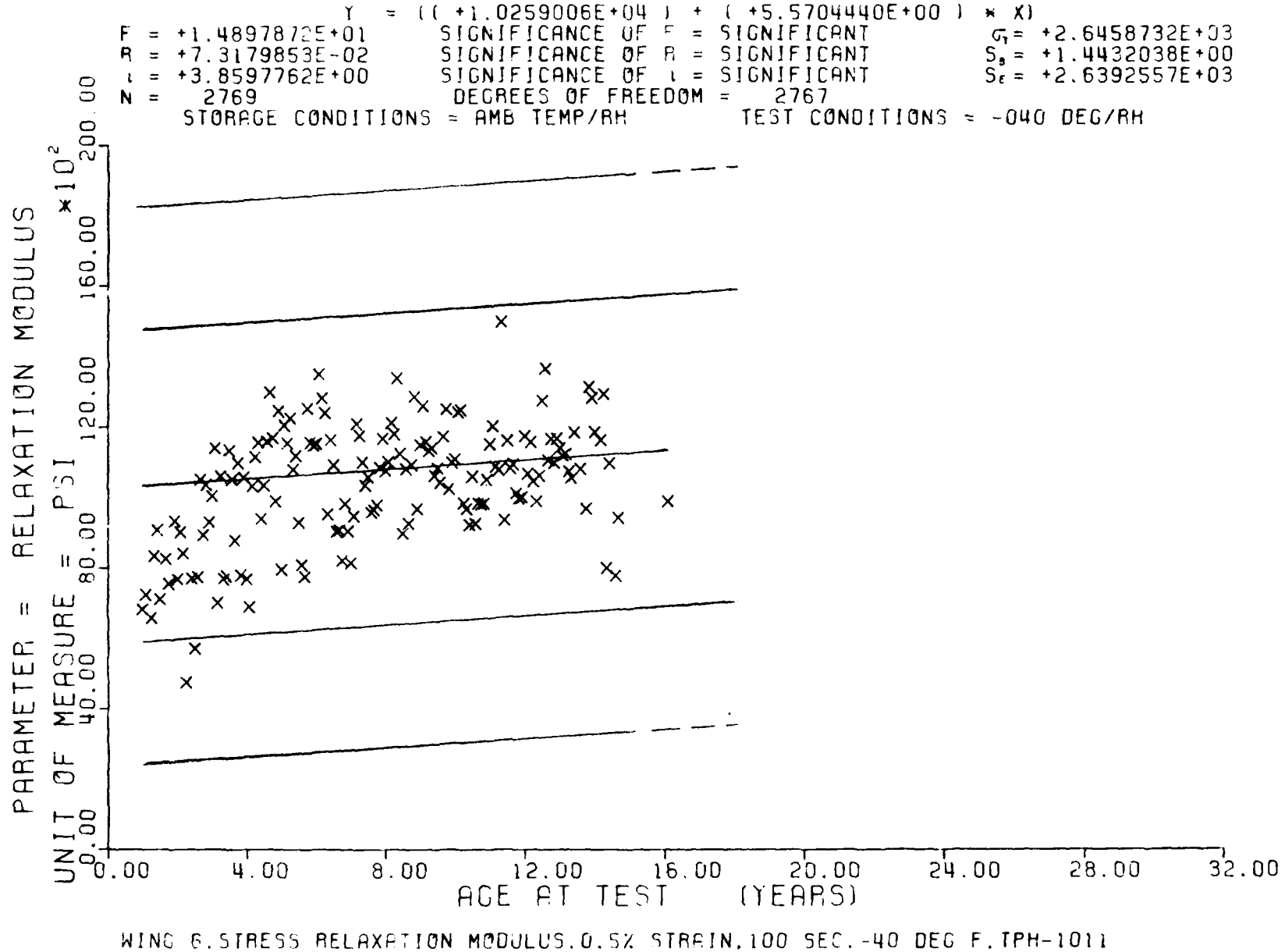

Y = ((+1.0259006E+04) + (+5.5704440E+00) * X)
F = +1.4897872E+01 SIGNIFICANCE OF F = SIGNIFICANT
R = +7.3179853E-02 SIGNIFICANCE OF R = SIGNIFICANT
t = +3.8597762E+00 SIGNIFICANCE OF t = SIGNIFICANT
N = 2769 DEGREES OF FREEDOM = 2767
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = -040 DEG/RH
σ_t = +2.6458732E+03
S_s = +1.4432038E+00
S_ε = +2.6392557E+03
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI *10²
0.00
40.00
80.00
120.00
160.00
200.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6.STRESS RELAXATION MODULUS.0.5% STRAIN.100 SEC.-40 DEG F.TPH-1011

Figure 31

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
16	3	41	3	66	3	91	21	116	51	142	30
17	3	42	15	67	10	92	21	117	21	143	26
18	2	43	9	68	9	93	21	118	21	144	12
17	7	44	2	69	29	94	21	119	27	145	6
18	5	45	6	70	24	95	32	120	33	146	6
19	2	46	6	71	46	96	57	121	21	147	12
21	2	47	9	72	42	97	57	122	9	148	3
22	4	48	3	73	24	98	54	123	12	149	12
23	6	49	6	74	30	99	42	124	23	151	15
24	2	50	27	75	38	100	21	125	18	152	9
25	2	51	33	76	26	101	27	126	20	153	6
26	4	52	48	77	37	102	11	127	17	154	9
27	6	53	15	78	36	103	21	128	24	155	9
28	3	54	32	79	15	104	9	129	3	156	9
29	9	55	18	80	24	105	9	130	33	157	9
30	3	56	18	81	39	106	9	131	54	158	6
31	9	57	30	82	27	107	15	132	15	159	6
32	2	58	16	83	15	108	18	133	9	160	9
33	12	59	6	84	27	109	12	134	42	161	15
34	6	60	72	85	12	110	12	135	18	163	3
35	2	61	21	86	21	111	6	137	18	165	3
36	24	62	45	87	20	112	39	138	29	166	6
37	6	63	24	88	24	113	53	139	69	167	12
38	12	64	27	89	24	114	41	140	12	168	6
40	3	65	12	90	36	115	48	141	12	170	9
										171	6
										172	3
										173	3
										175	3
										176	6
										193	3
										226	3

*PSI 0.STRESS RELAXATION MODULUS,2.0% STRAIN,10 SEC, 20 DEG F,TPH-1011

This sample size summary is applicable to figures 32 thru 35

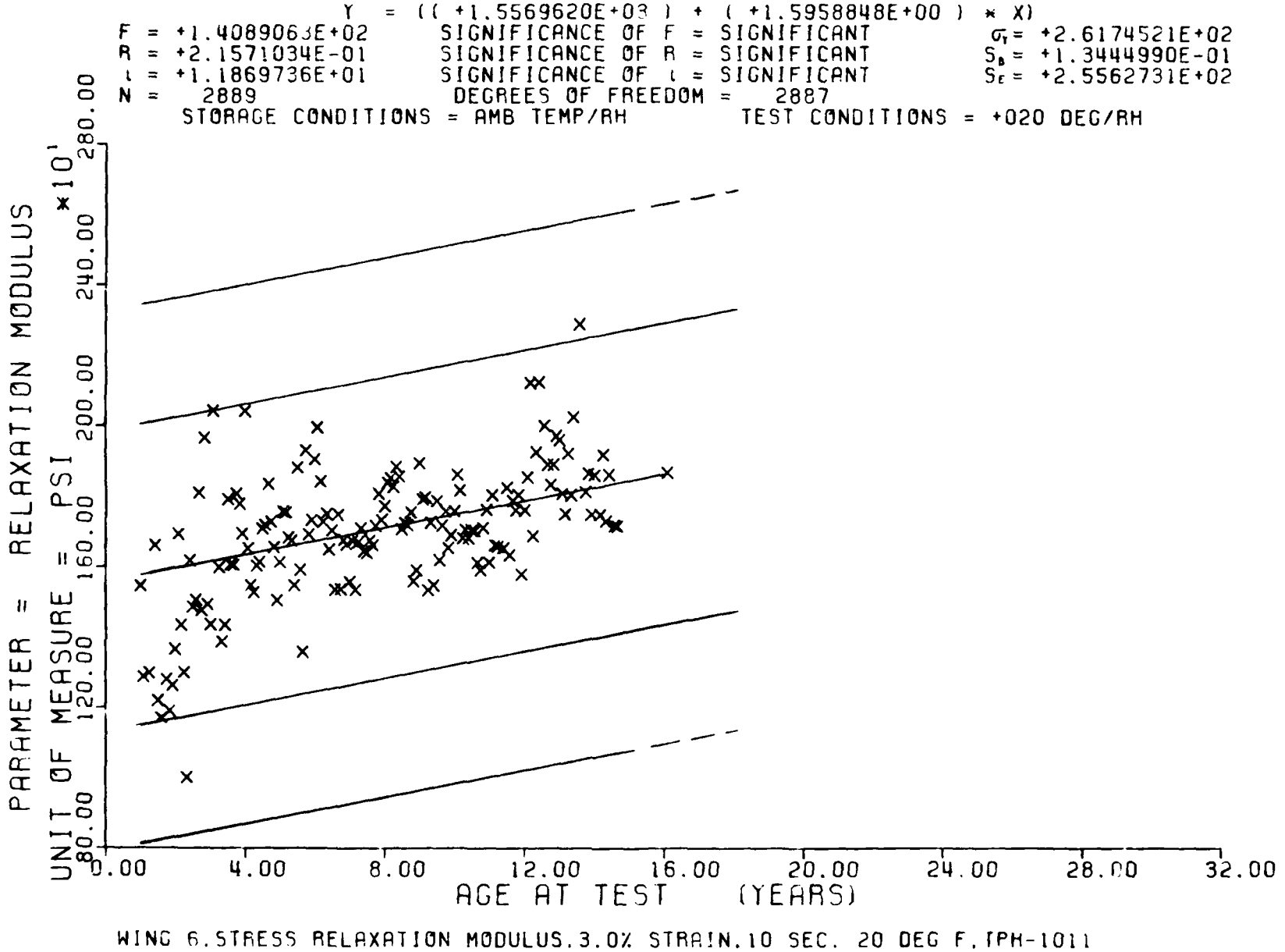

Y = ((+1.5569620E+03) + (+1.5958848E+00) * X)
F = +1.4089063E+02 SIGNIFICANCE OF F = SIGNIFICANT σT = +2.6174521E+02
R = +2.1571034E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +1.3444990E-01
t = +1.1869736E+01 SIGNIFICANCE OF t = SIGNIFICANT Se = +2.5562731E+02
N = 2889 DEGREES OF FREEDOM = 2887
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +020 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI *10¹
80.00
120.00
160.00
200.00
240.00
280.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6.STRESS RELAXATION MODULUS.3.0% STRAIN.10 SEC. 20 DEG F.IPH-1011

Figure 32

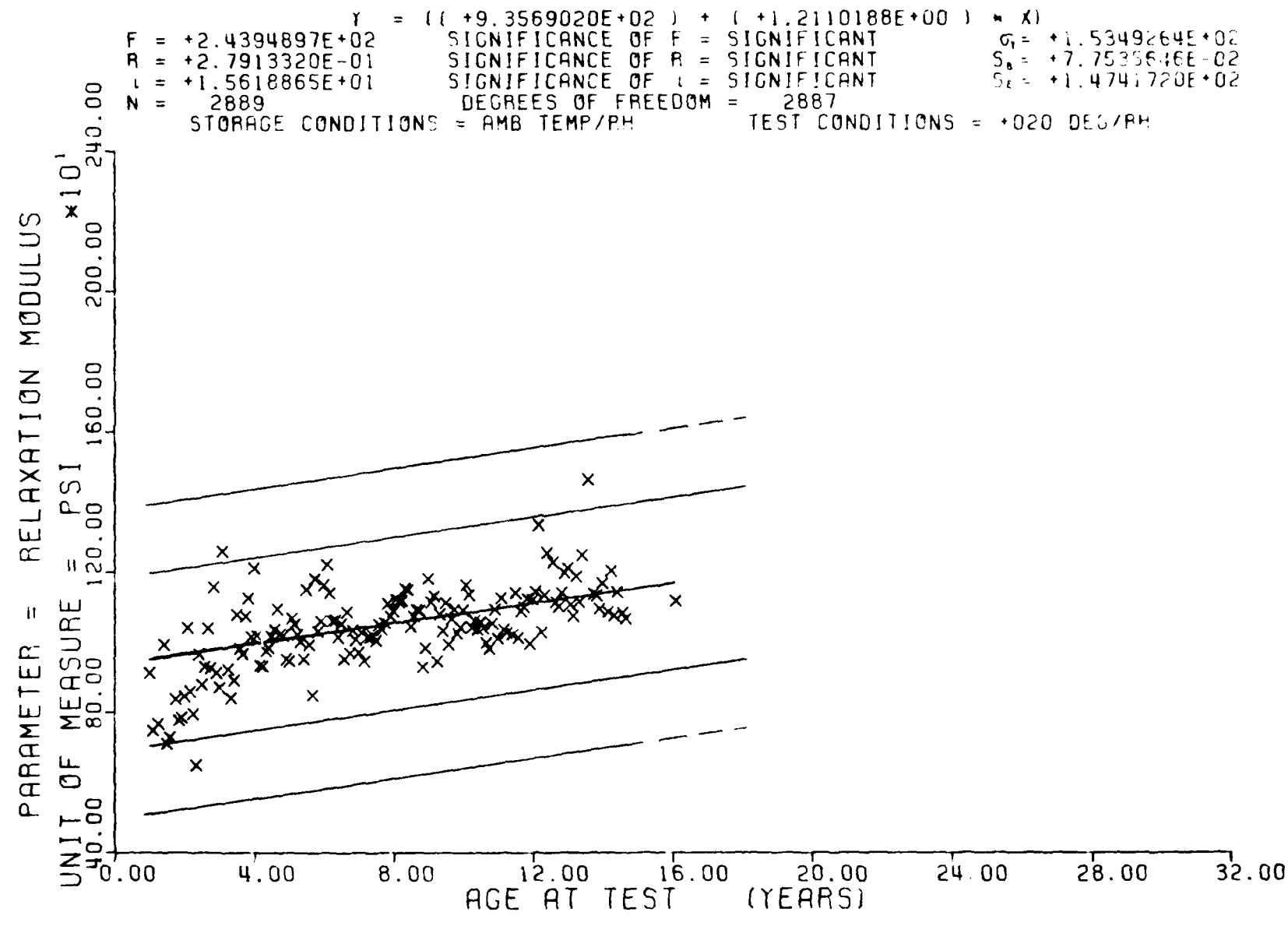
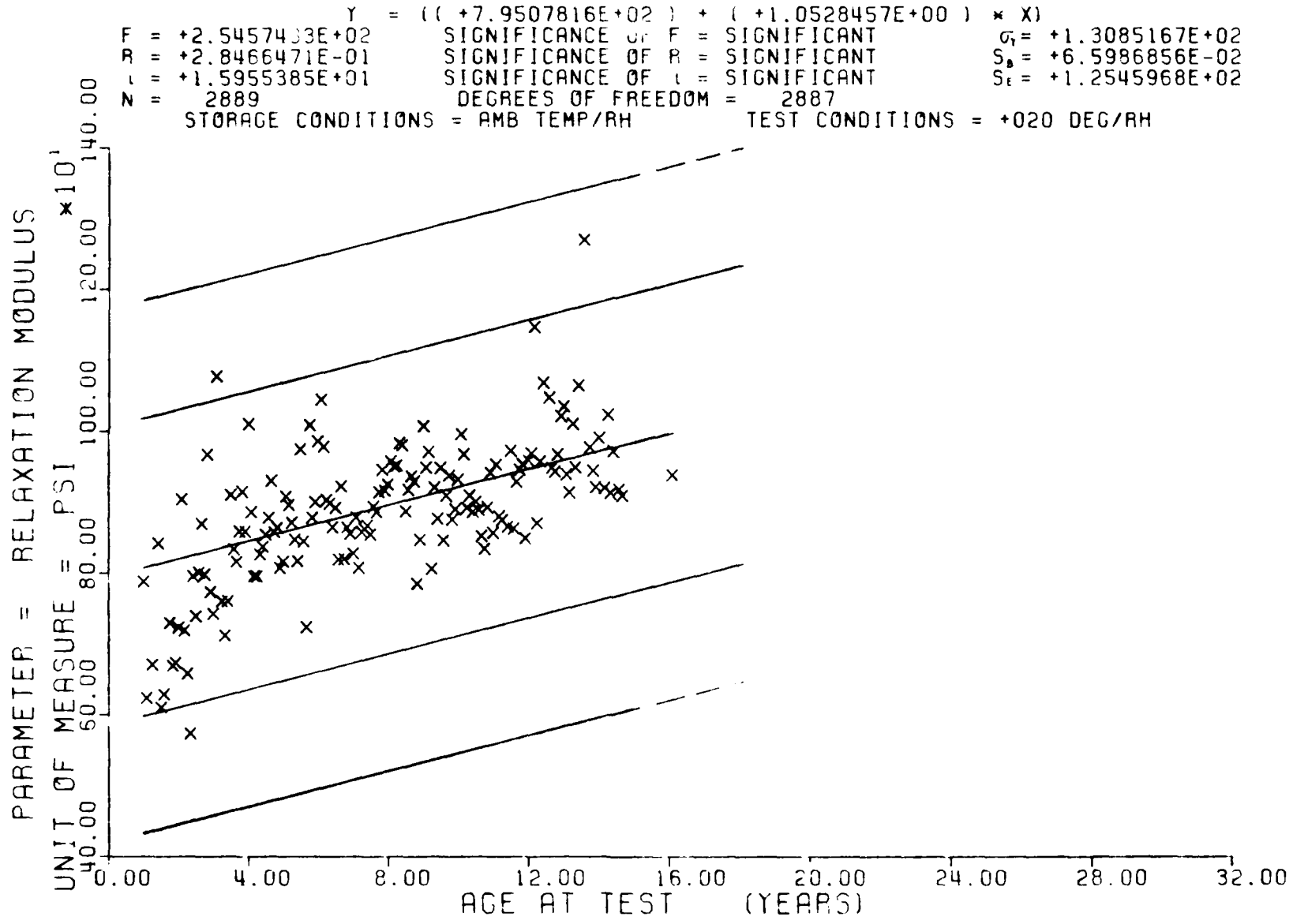
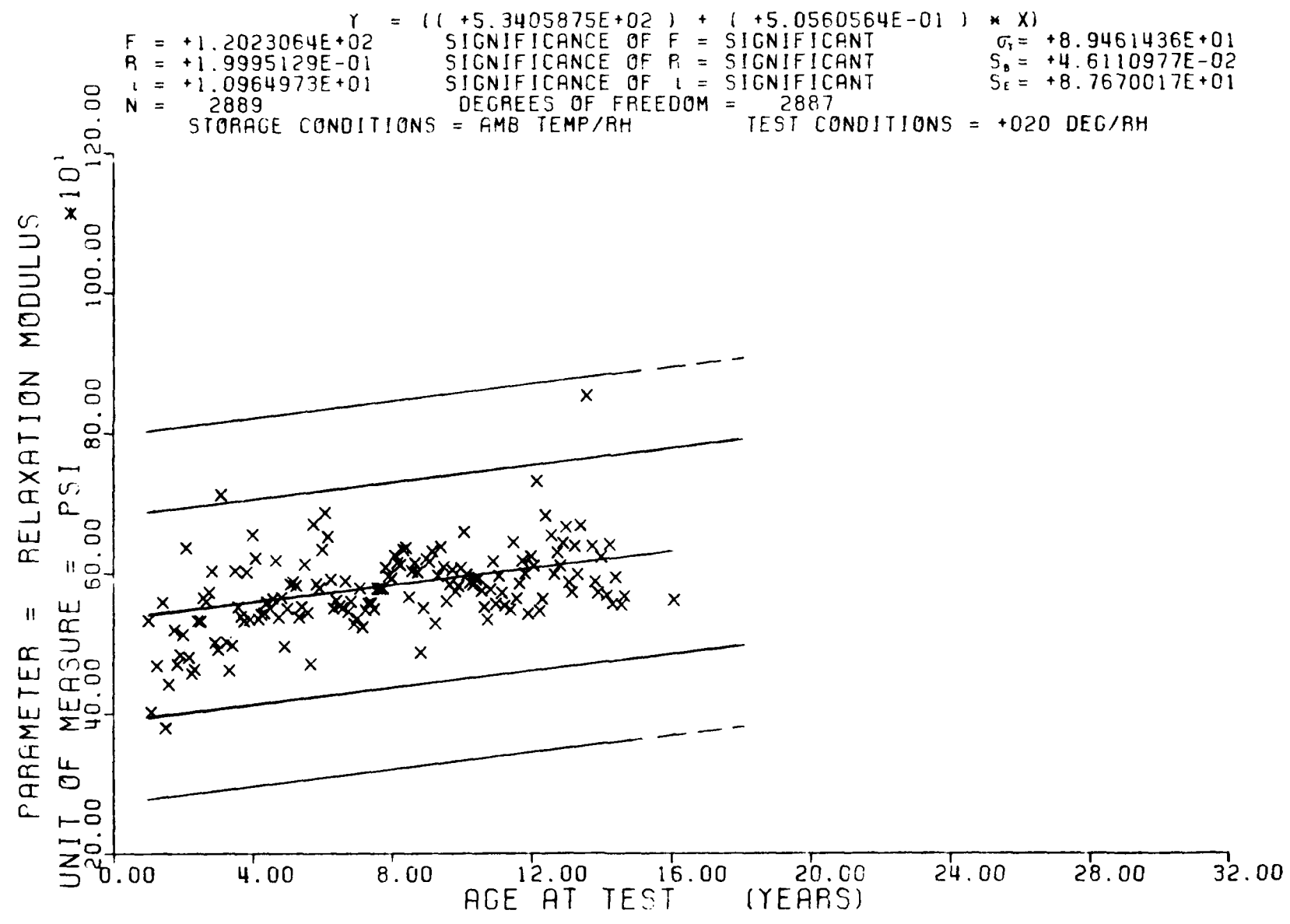

Y = ((+9.3569020E+02) + (+1.2110188E+00) * X)
F = +2.4394897E+02 SIGNIFICANCE OF F = SIGNIFICANT
R = +2.7913320E-01 SIGNIFICANCE OF R = SIGNIFICANT
N = 2889 DEGREES OF FREEDOM = 2887
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = +020 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI *10¹
40.00
80.00
120.00
160.00
200.00
240.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC. 20 DEG F, TPH-1011

Figure 33



WING 6.STRESS RELAXATION MODULUS,3.0% STRAIN,100 SEC. 20 DEG F,TPH-1011

Figure 34



WING 6.STRESS RELAXATION MODULUS,3.0% STRAIN,1000 SEC, 20 DEG F.TPH-1011

Figure 35

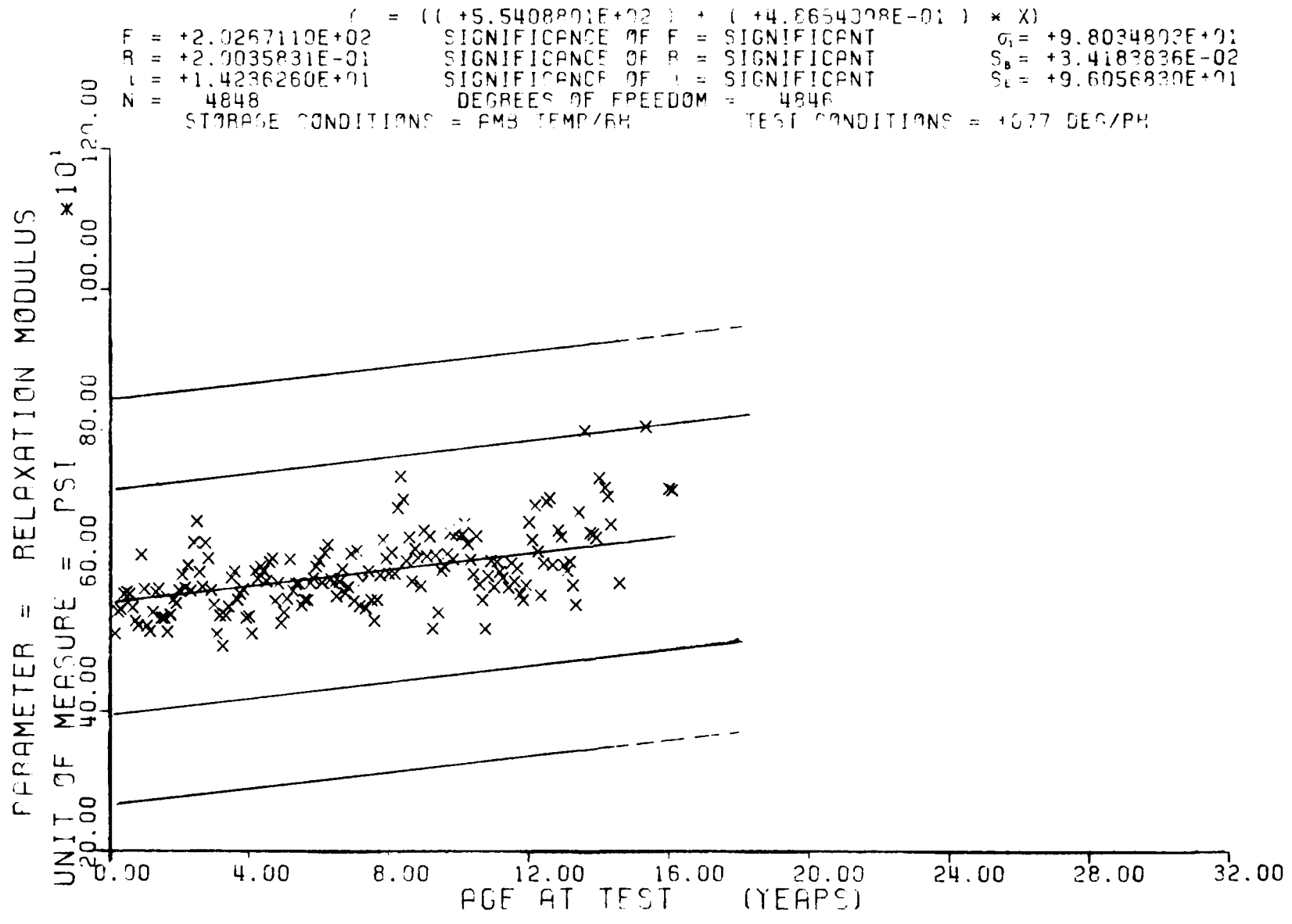
*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
2	3	27	24	52	72	77	33	102	15	127	18
3	6	28	27	53	18	78	39	103	26	128	24
4	16	29	48	54	39	79	21	104	12	129	3
5	22	30	43	55	22	80	21	105	6	130	42
6	21	31	30	56	36	81	45	106	3	131	45
7	35	32	60	57	51	82	21	107	10	132	14
8	30	33	29	58	45	83	15	108	24	133	12
9	45	34	51	59	39	84	21	109	9	134	39
10	38	35	36	60	74	85	15	110	9	135	15
11	37	36	58	61	66	86	21	111	9	137	18
12	65	37	18	62	82	87	36	112	30	138	45
13	51	38	24	63	63	88	21	113	62	139	48
14	46	39	42	64	51	89	30	114	44	140	15
15	57	40	18	65	36	90	42	115	30	141	12
16	36	41	24	66	39	91	14	116	71	142	27
17	46	42	12	67	36	92	23	117	18	143	33
18	13	43	9	68	51	93	19	118	21	144	6
19	10	44	9	69	75	94	18	119	21	145	6
20	4	45	6	70	99	95	39	120	36	146	6
21	27	46	18	71	62	96	96	121	15	147	12
22	9	47	30	72	66	97	90	122	9	148	3
23	6	48	36	73	51	98	96	123	12	149	6
24	34	49	42	74	66	99	42	124	24	150	6
25	27	50	30	75	45	100	20	125	18	151	15
26	30	51	82	76	27	101	34	126	22	152	3

WING 6,STRESS RELAXATION MODULUS,3.0% STRAIN,10 SEC, 77 DEG F,TPH-1011

This sample size summary is applicable to figures 36 thru 39

Age	Nr	Age	Nr
154	12	166	6
155	3	167	12
156	9	168	3
157	9	170	3
158	9	171	6
159	3	172	3
160	6	175	3
161	5	184	3
163	3	192	1
165	3	193	2



WING 6,STRESS RELAXATION MODULUS,3.0% STRAIN,10 SEC. 77 DEG F,TPH-1011

Figure 36

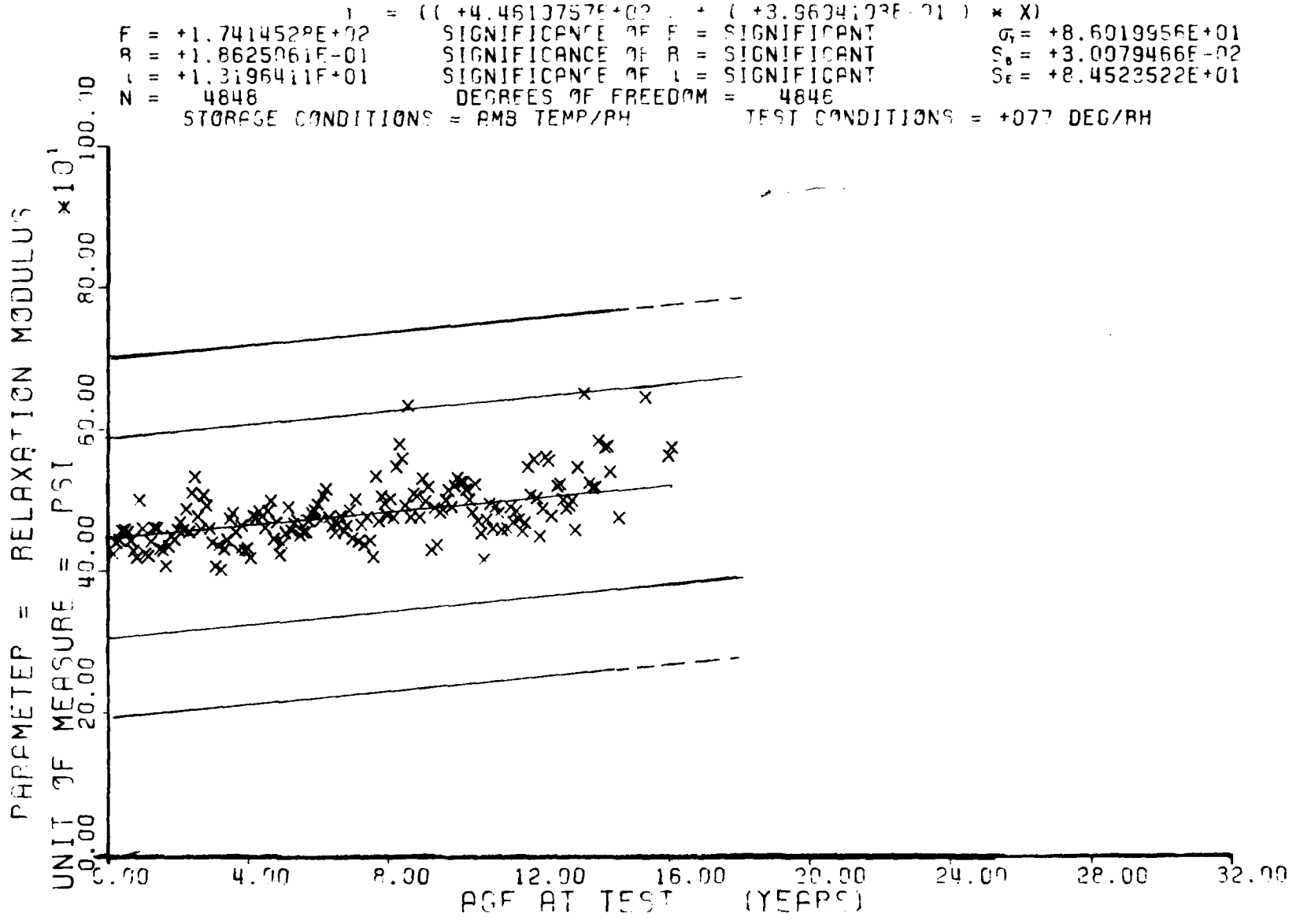

Y = ((+4.4610757E+02) + (+3.9604103E-01) * X)
F = +1.741452?E+02 SIGNIFICANCE OF F = SIGNIFICANT σ = +8.6019956E+01
R = +1.8625061E-01 SIGNIFICANCE OF R = SIGNIFICANT S = +3.0079466E-02
t = +1.3196411E+01 SIGNIFICANCE OF t = SIGNIFICANT Se = +8.4523522E+01
N = 4848 DEGREES OF FREEDOM = 4848
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +077 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI x10¹
100.00
80.00
60.00
40.00
20.00
0.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6,STRESS RELAXATION MODULUS,3.0% STRAIN,50 SEC, 77 DEG F,TPH-1011

Figure 37

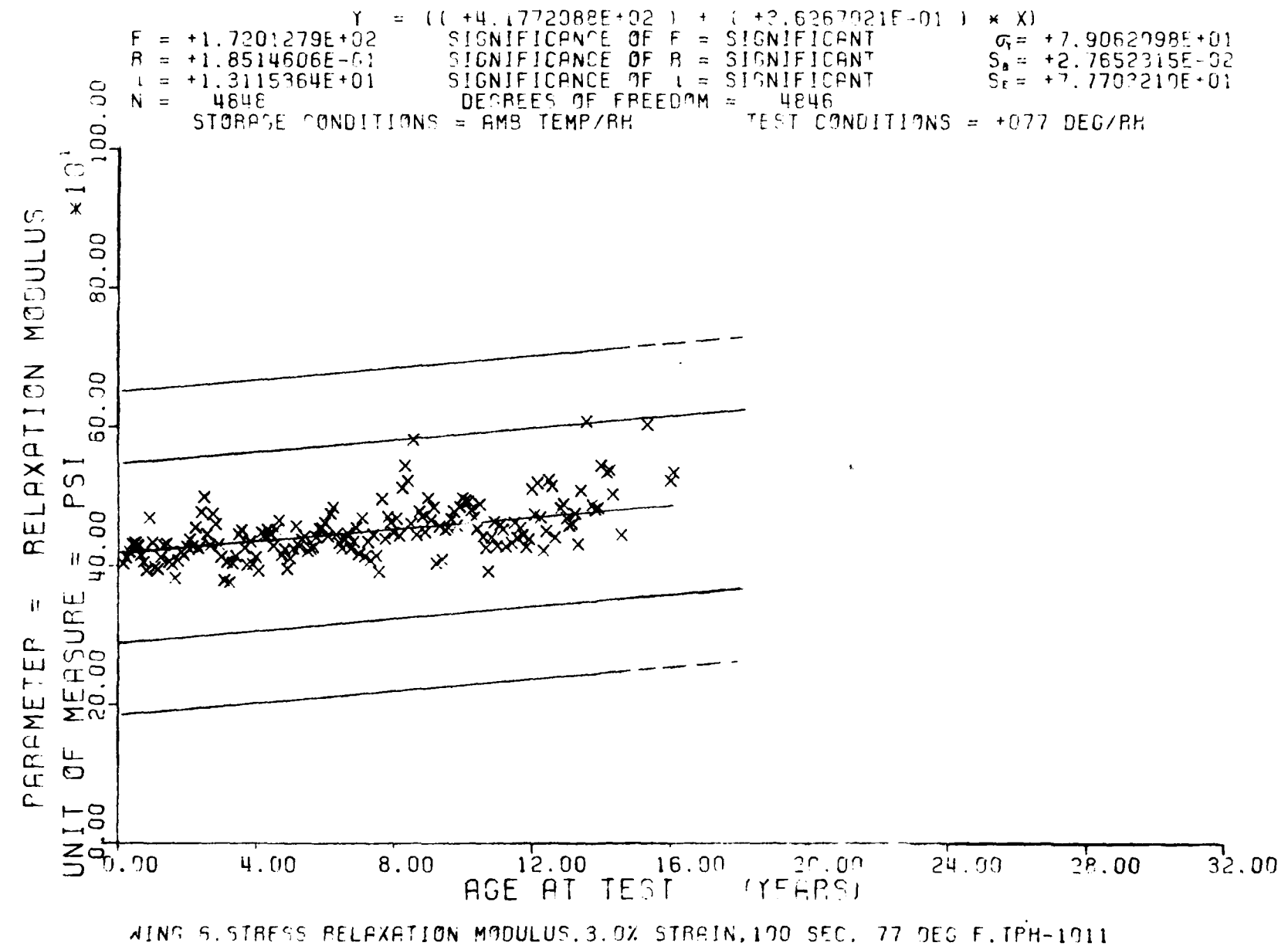

Y = ((+4.1772088E+02) + (+3.6267021E-01) * X)
F = +1.7201279E+02 SIGNIFICANCE OF F = SIGNIFICANT σt = +7.9062098E+01
R = +1.8514606E-01 SIGNIFICANCE OF R = SIGNIFICANT Sa = +2.7652315E-02
t = +1.3115364E+01 SIGNIFICANCE OF t = SIGNIFICANT Sr = +7.7032210E+01
N = 4846 DEGREES OF FREEDOM = 4846
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +077 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI *10^1
100.00
80.00
60.00
40.00
20.00
0.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING S.STRESS RELAXATION MODULUS,3.0% STRAIN,100 SEC. 77 DEG F.TPH-1011

Figure 38

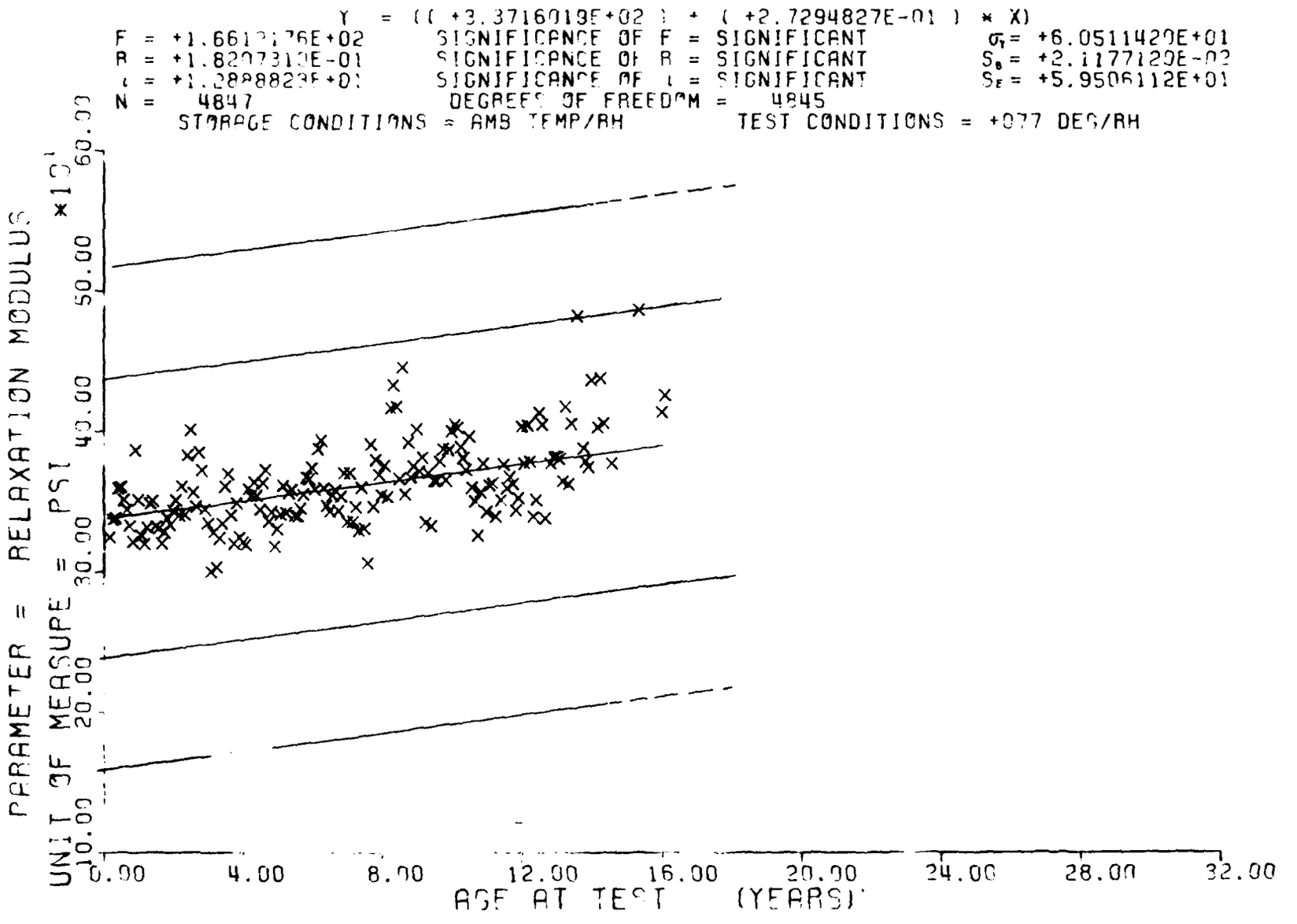

Y = ((+3.3716019E+02) + (+2.7294827E-01) * X)
F = +1.6613176E+02 SIGNIFICANCE OF F = SIGNIFICANT
R = +1.8207319E-01 SIGNIFICANCE OF R = SIGNIFICANT
N = 4847 DEGREES OF FREEDOM = 4845
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +077 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI
*10¹
60.00
50.00
40.00
30.00
20.00
10.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6,STRESS RELAXATION MODULUS,3.0% STRAIN,1000 SEC, 77 DEG F,TPH-1011

Figure 39

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
12	3	43	9	68	12	93	21	118	21	143	30
13	3	44	3	69	24	94	21	119	21	144	12
15	6	45	9	70	27	95	27	120	36	145	6
17	15	46	6	71	48	96	60	121	18	146	6
19	6	47	9	72	42	97	57	122	9	147	12
20	3	48	3	73	24	98	60	123	15	148	3
21	3	49	6	74	42	99	39	124	21	149	9
22	6	50	27	75	36	100	21	125	15	150	6
23	3	51	57	76	29	101	24	126	24	151	15
24	6	52	45	77	33	102	9	127	17	152	6
25	9	53	12	78	36	103	21	128	21	154	12
26	9	54	28	79	18	104	9	129	3	155	3
28	3	55	27	80	24	105	9	130	42	156	6
29	9	56	27	81	39	106	3	131	48	157	12
30	9	57	31	82	27	107	8	132	9	158	9
31	3	58	24	83	18	108	21	133	15	159	3
32	9	59	12	84	21	109	9	134	39	160	9
33	9	60	15	85	12	110	9	135	12	161	15
35	15	61	20	86	18	111	9	136	6	163	3
36	24	62	48	87	18	112	33	137	21	165	3
38	6	63	21	88	14	113	51	138	51	166	6
39	9	64	33	89	18	114	44	139	51	167	12
40	9	65	9	90	30	115	30	140	21	168	3
41	12	66	12	91	24	116	36	141	18	170	3
42	6	67	6	92	24	117	21	142	27	171	6
										172	3
										175	3
										193	3

WING 6,STRESS RELAXATION MODULUS,3.0% STRAIN,10 SEC,100 DEG F,TPH-1011

This sample size summary is applicable to figures 40 thru 43

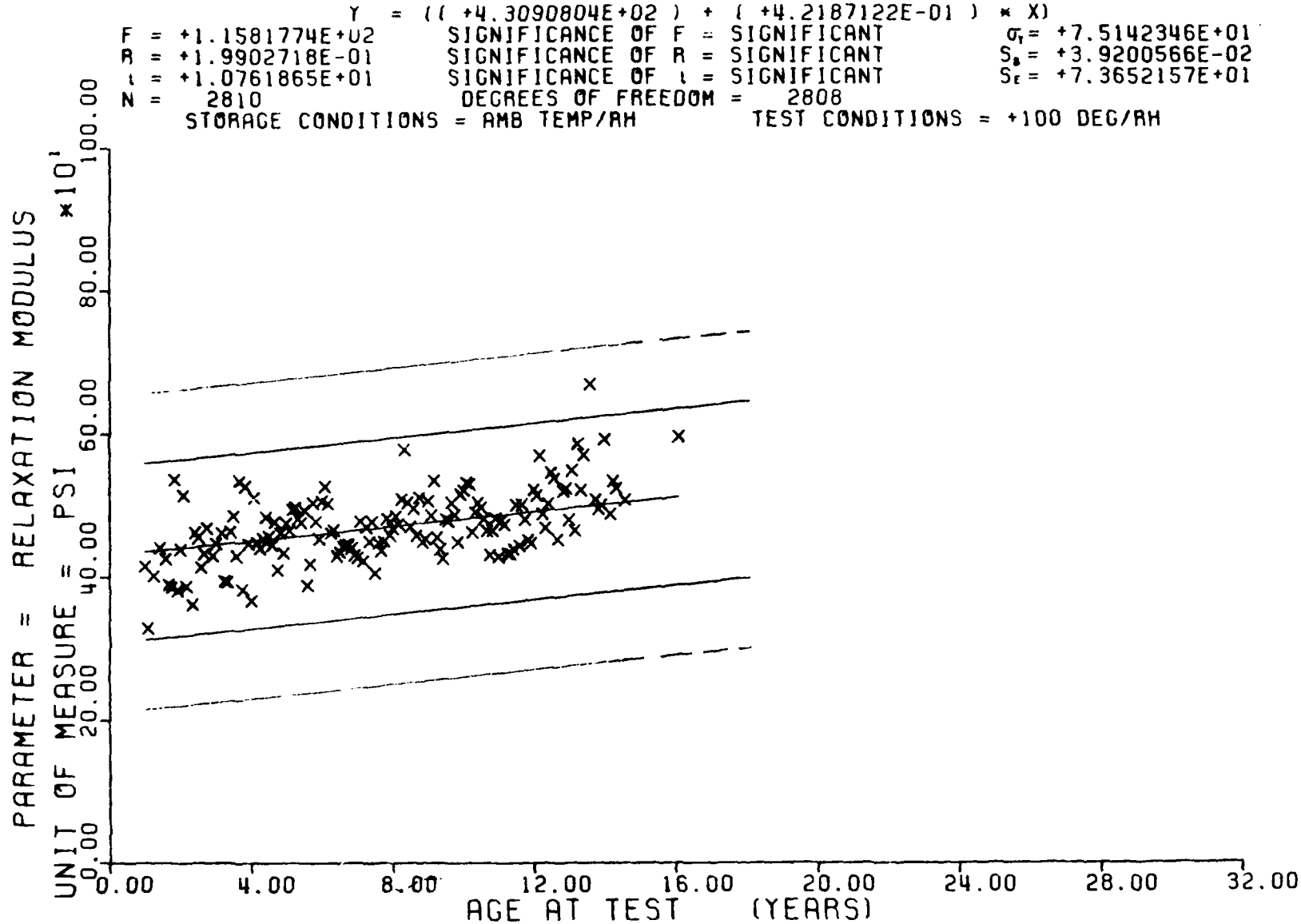
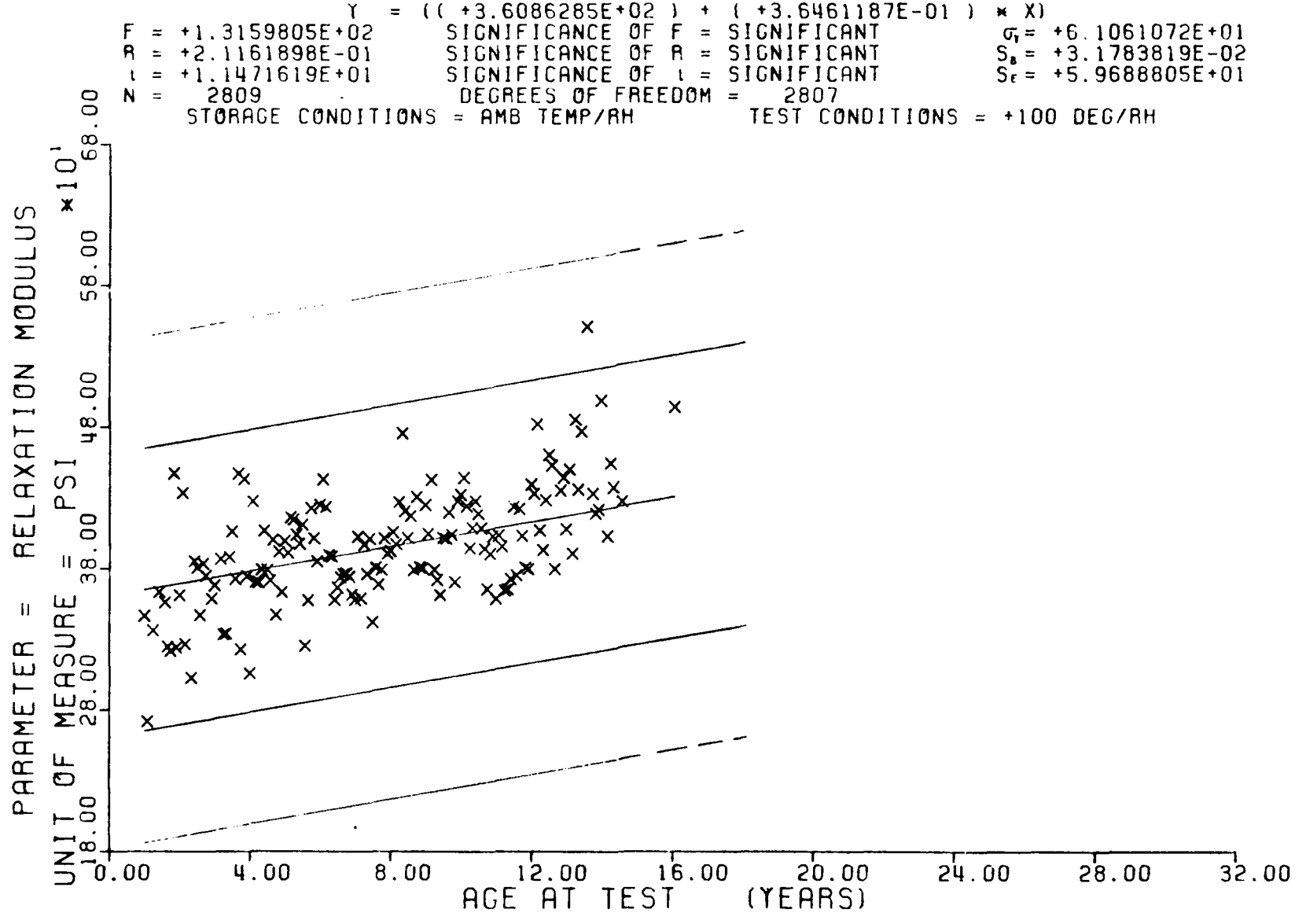
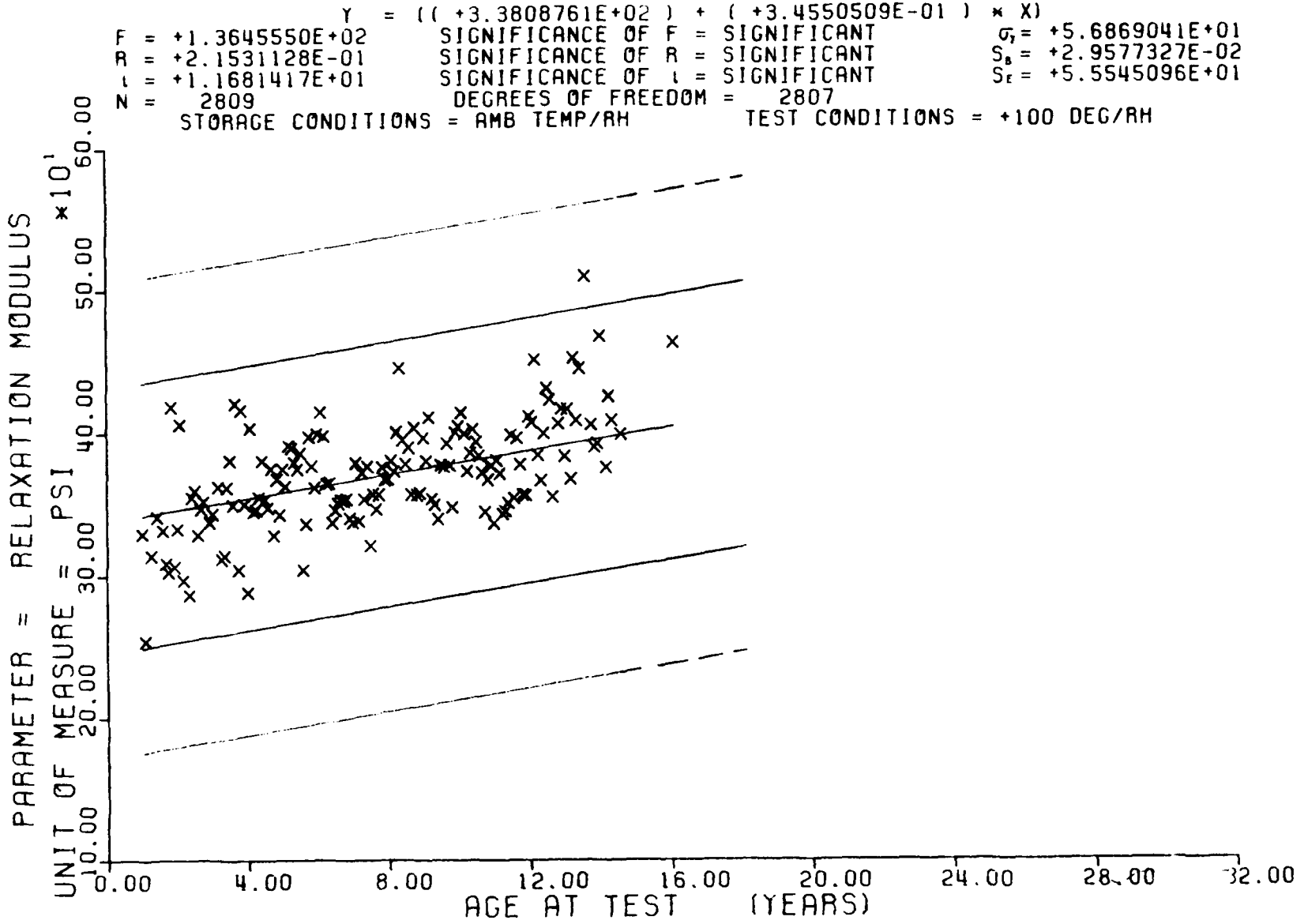

Y = ((+4.3090804E+02) + (+4.2187122E-01) * X)
F = +1.1581774E+02 SIGNIFICANCE OF F = SIGNIFICANT σr = +7.5142346E+01
R = +1.9902718E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +3.9200566E-02
t = +1.0761865E+01 SIGNIFICANCE OF t = SIGNIFICANT Sr = +7.3652157E+01
N = 2810 DEGREES OF FREEDOM = 2808
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +100 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI *10¹
0.00
20.00
40.00
60.00
80.00
100.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6.STRESS RELAXATION MODULUS,3.0% STRAIN,10 SEC.100 DEG F.TPH-1011

Figure 40



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC, 100 DEG F, TPH-1011

Figure 41



WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 100 SEC, 100 DEG F, TPH-1011

Figure 42

Y = ((+2.7198106E+02) + (+2.3085690E-01) * X)

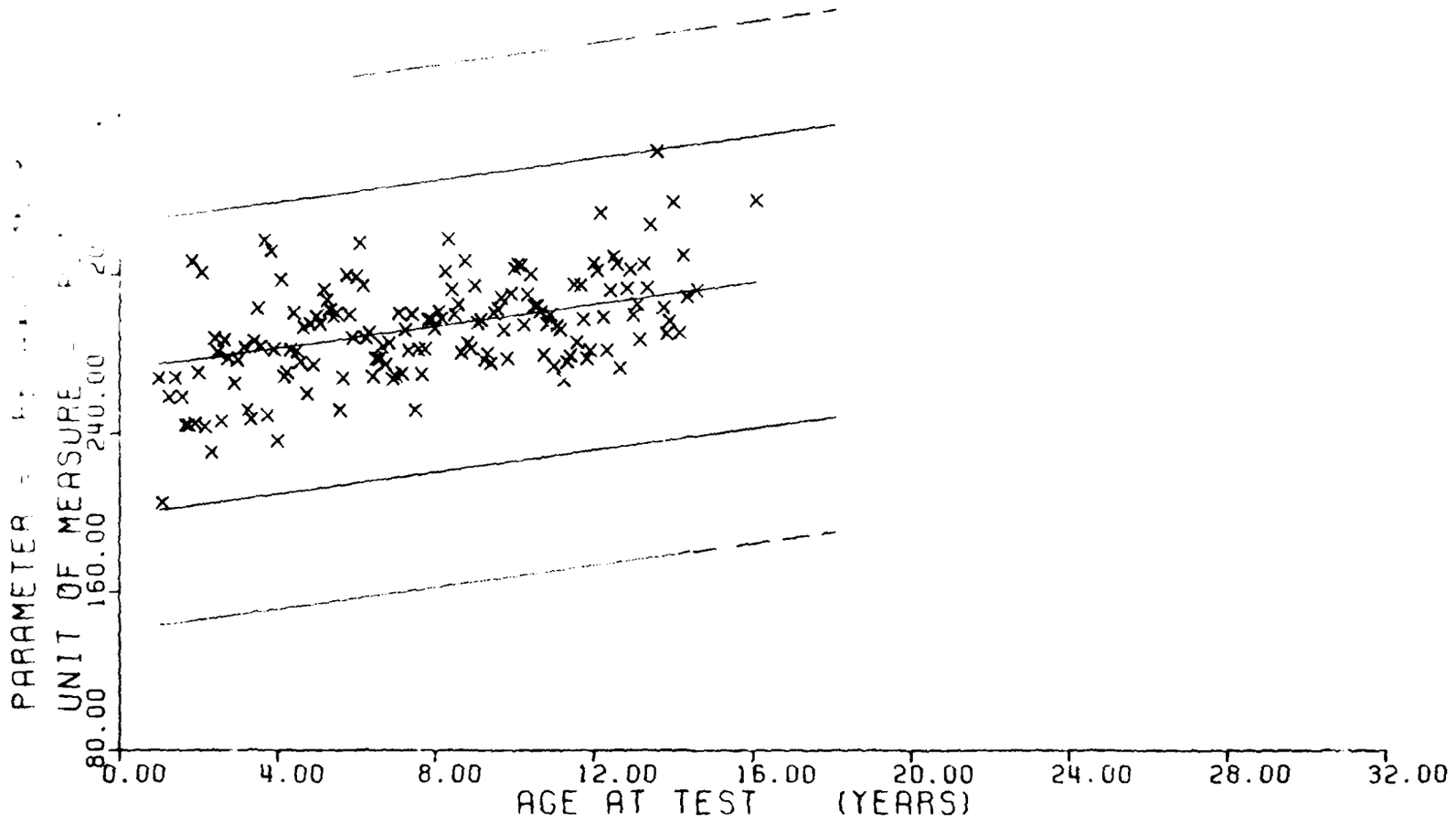
[illegible]E+01 SIGNIFICANCE OF F = SIGNIFICANT σ_t = +4.4679105E+01

[illegible]E-01 SIGNIFICANCE OF R = SIGNIFICANT S_θ = +2.3408304E-02

[illegible]E+00 SIGNIFICANCE OF t = SIGNIFICANT S_ε = +4.3930855E+01

DEGREES OF FREEDOM = 2801

[illegible]GE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +100 DEG/RH



WING 6.STRESS RELAXATION MODULUS.3.0% STRAIN.1000 SEC.100 DEG F.TPH-1011

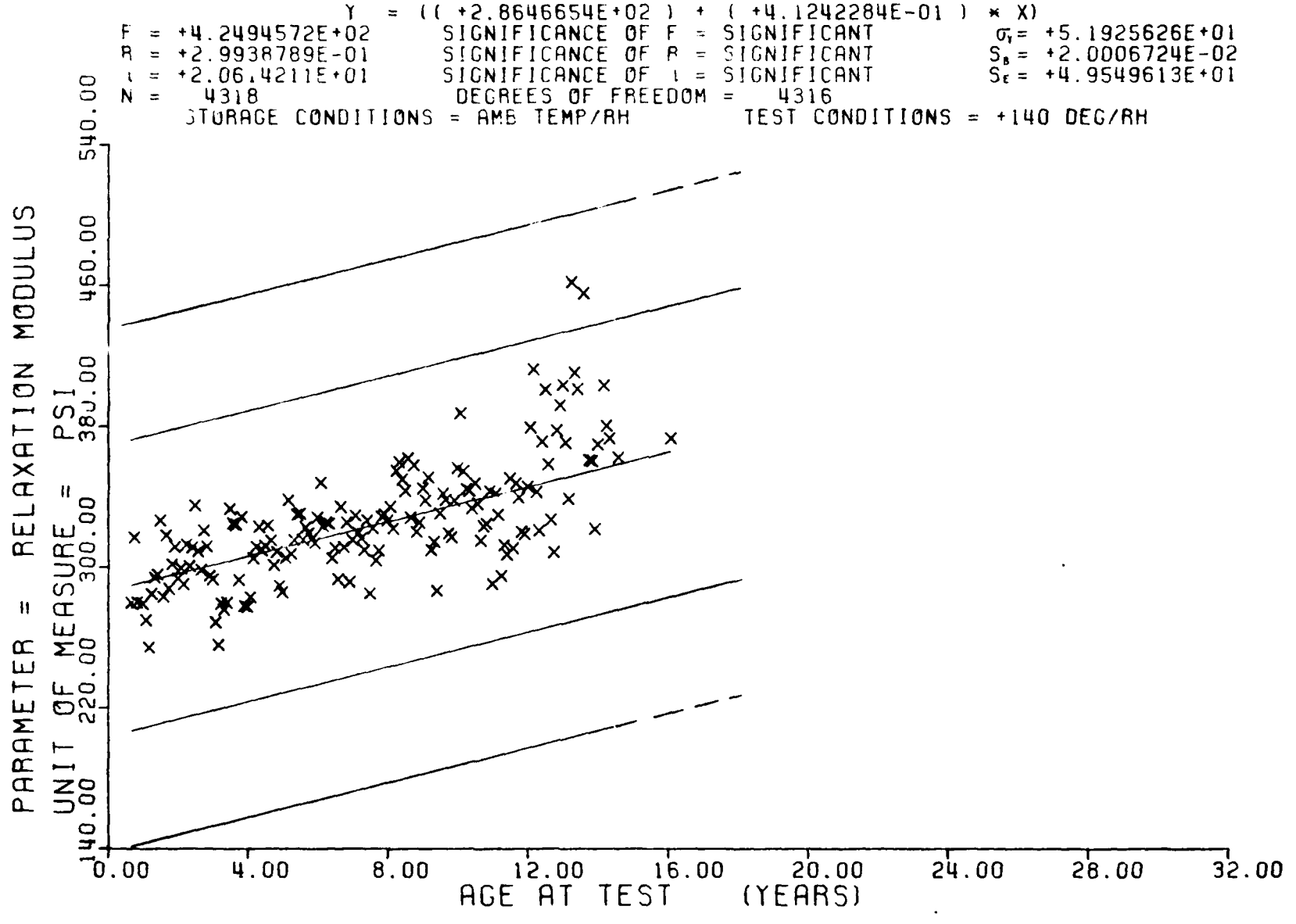
Figure 43

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
8	2	34	57	59	42	84	21	109	9	134	39
9	3	35	36	60	65	85	12	110	12	135	12
10	3	36	51	61	75	86	18	111	9	136	6
12	24	37	21	62	72	87	24	112	30	137	21
13	27	38	18	63	60	88	15	113	51	138	42
14	9	39	48	64	57	89	21	114	44	139	54
15	27	40	18	65	33	90	24	115	27	140	12
16	15	41	21	66	45	91	27	116	39	141	15
17	39	42	15	67	30	92	18	117	21	142	27
18	10	43	9	68	48	93	24	118	27	143	33
19	6	44	9	69	78	94	24	119	21	144	9
20	6	45	3	70	84	95	32	120	33	145	6
21	13	46	12	71	69	96	90	121	21	146	6
22	6	47	30	72	69	97	77	122	9	147	12
23	9	48	39	73	45	98	93	123	15	148	3
24	33	49	39	74	62	99	42	124	21	149	9
25	30	50	36	75	48	100	21	125	15	150	6
26	30	51	66	76	36	101	21	126	24	151	15
27	21	52	69	77	36	102	8	127	17	152	6
28	27	53	27	78	36	103	21	128	18	153	3
29	48	54	30	79	17	104	6	129	2	154	9
30	45	55	33	80	23	105	9	130	36	155	3
31	33	56	42	81	33	106	3	131	54	156	9
32	57	57	51	82	27	107	6	132	9	157	9
33	27	58	57	83	18	108	24	133	15	158	9
										159	3
										160	6
										161	19
										163	3
										165	3
										166	6
										167	12
										168	3
										170	3
										171	6
										172	3
										175	3
										193	3

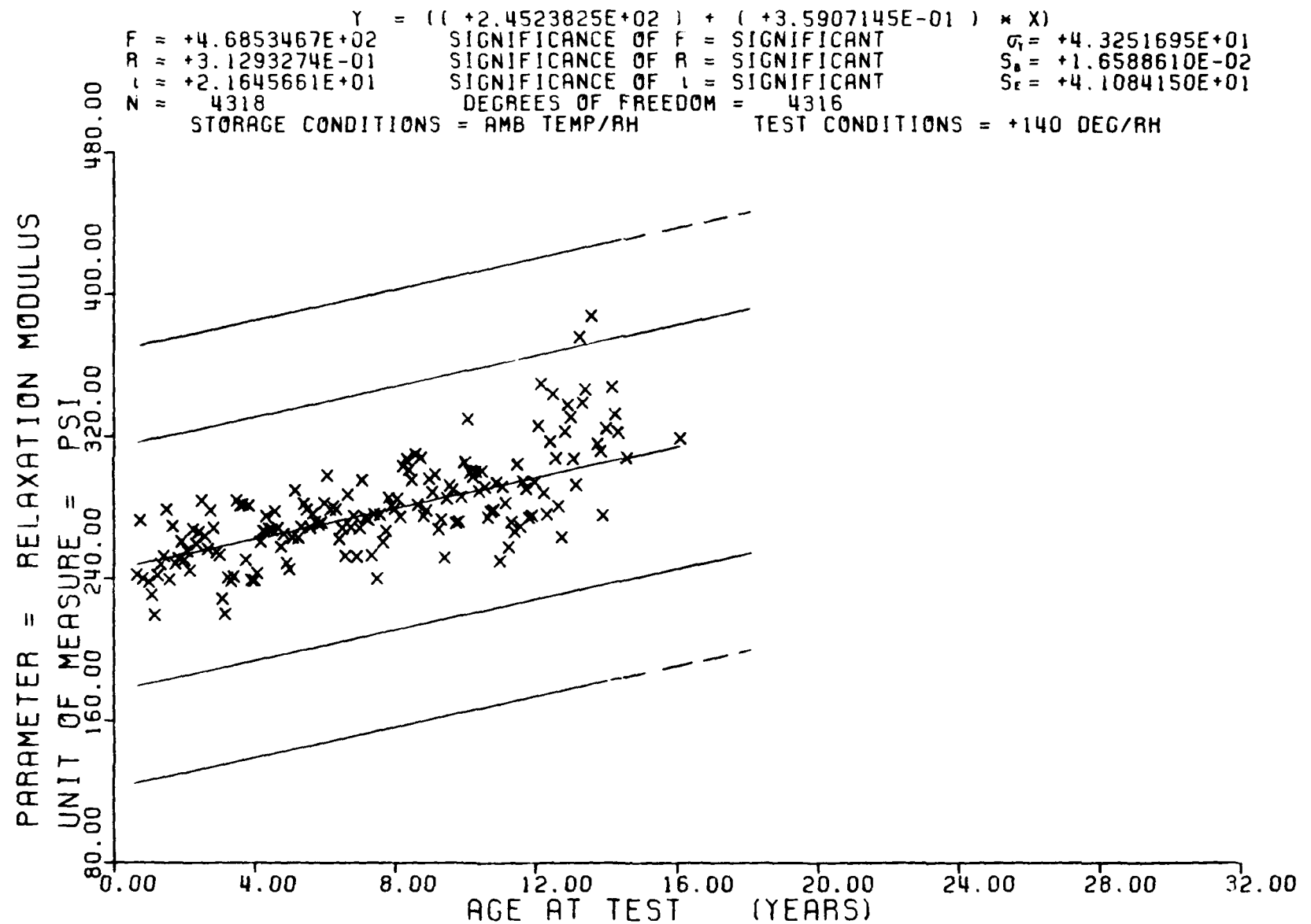
AIMS 6,STRESS RELAXATION MODULUS,3.0% STRAIN,10 SEC,140 DEG F,TPH-1011

This sample size summary is applicable to figures 44 thru 47



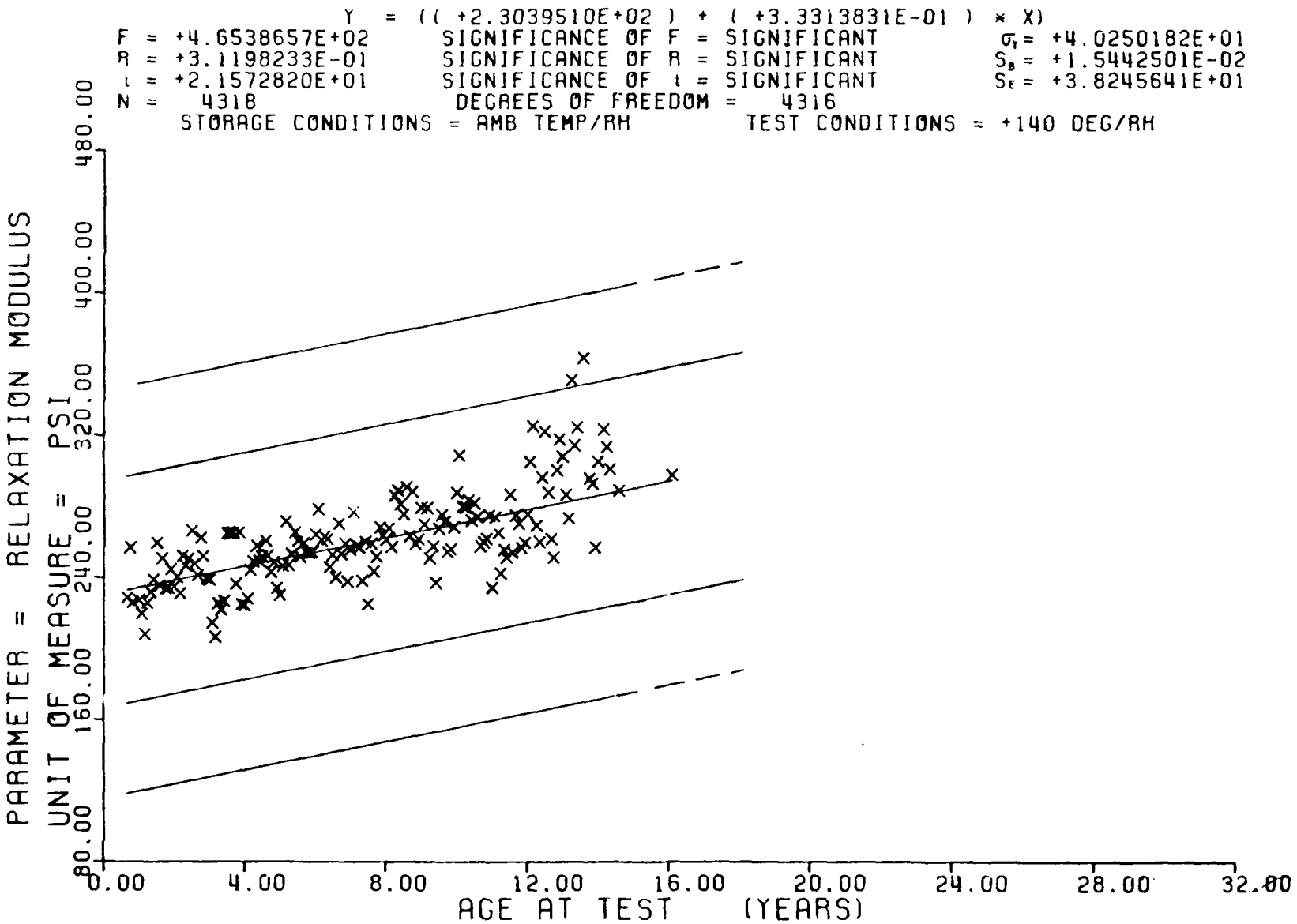
WING 6.STRESS RELAXATION MODULUS.3.0% STRAIN.10 SEC.140 DEG F.TPH-1011

Figure 44



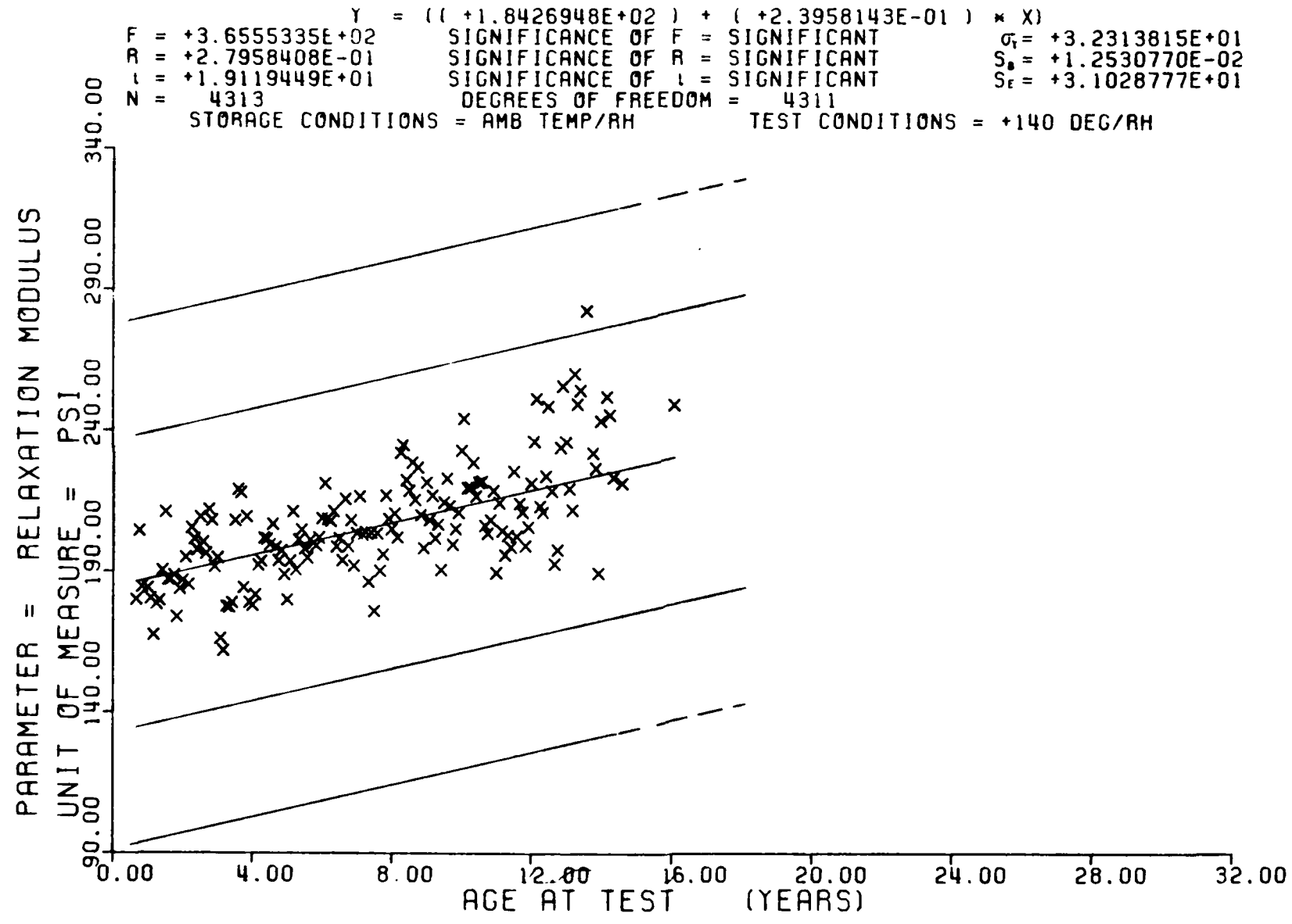
WING 6.STRESS RELAXATION MODULUS,3.0% STRAIN,50 SEC,140 DEG F,TPH-1011

Figure 45



WING 6.STRESS RELAXATION MODULUS,3.0% STRAIN,100 SEC.140 DEG F,TPH-1011

Figure 46



WING 6.STRESS RELAXATION MODULUS,3.0% STRAIN,1000 SEC,140 DEG F,TPH-1011

Figure 47

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
8	[illegible]	34	51	59	42	84	24	109	9	134	27
9	[illegible]	35	33	60	63	85	9	110	9	135	12
10	6	36	57	61	69	86	21	111	6	136	6
12	24	37	21	62	73	87	27	112	36	137	21
13	24	38	18	63	66	88	30	113	54	138	60
14	12	39	48	64	51	89	30	114	41	139	50
15	24	40	18	65	36	90	39	115	24	140	12
16	18	41	21	66	45	91	27	116	39	141	15
17	[illegible]	42	18	67	30	92	18	117	21	142	26
18	18	43	9	68	51	93	24	118	20	143	39
19	9	44	6	69	78	94	23	119	15	144	12
20	6	45	6	70	80	95	30	120	32	145	3
21	18	46	6	71	45	96	102	121	12	146	6
22	9	47	30	72	75	97	78	122	9	147	9
23	9	48	42	73	50	98	99	123	15	148	6
24	30	49	42	74	54	99	42	124	21	149	12
25	35	50	36	75	51	100	20	125	15	150	6
26	24	51	57	76	39	101	19	126	24	151	15
27	24	52	63	77	27	102	9	127	17	152	6
28	26	53	27	78	42	103	21	128	15	153	3
29	30	54	33	79	18	104	6	129	6	154	6
30	42	55	33	80	24	105	12	130	30	155	6
31	33	56	42	81	36	106	3	131	54	156	12
32	54	57	54	82	27	107	6	132	12	157	9
33	30	58	57	83	18	108	27	133	15	158	9
										159	3
										160	9
										161	18
										165	3
										166	6
										167	12
										168	3
										170	3
										171	6
										172	3
										175	3
										193	3

WING 6,STRESS RELAXATION MODULUS,3.0% STRAIN,10 SEC,180 DEG F,TPH-1011

This sample size summary is applicable to figures 48 thru 51

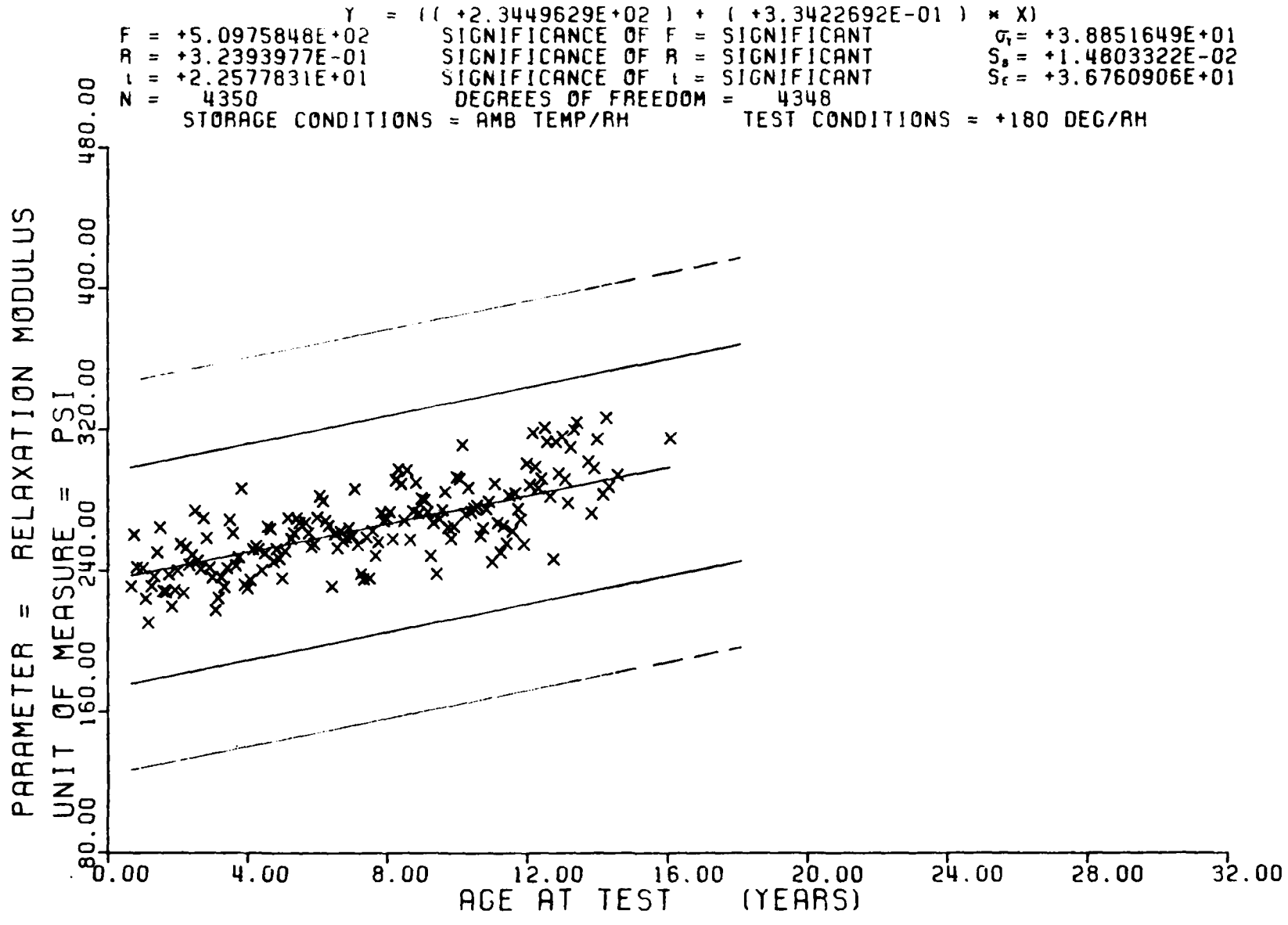
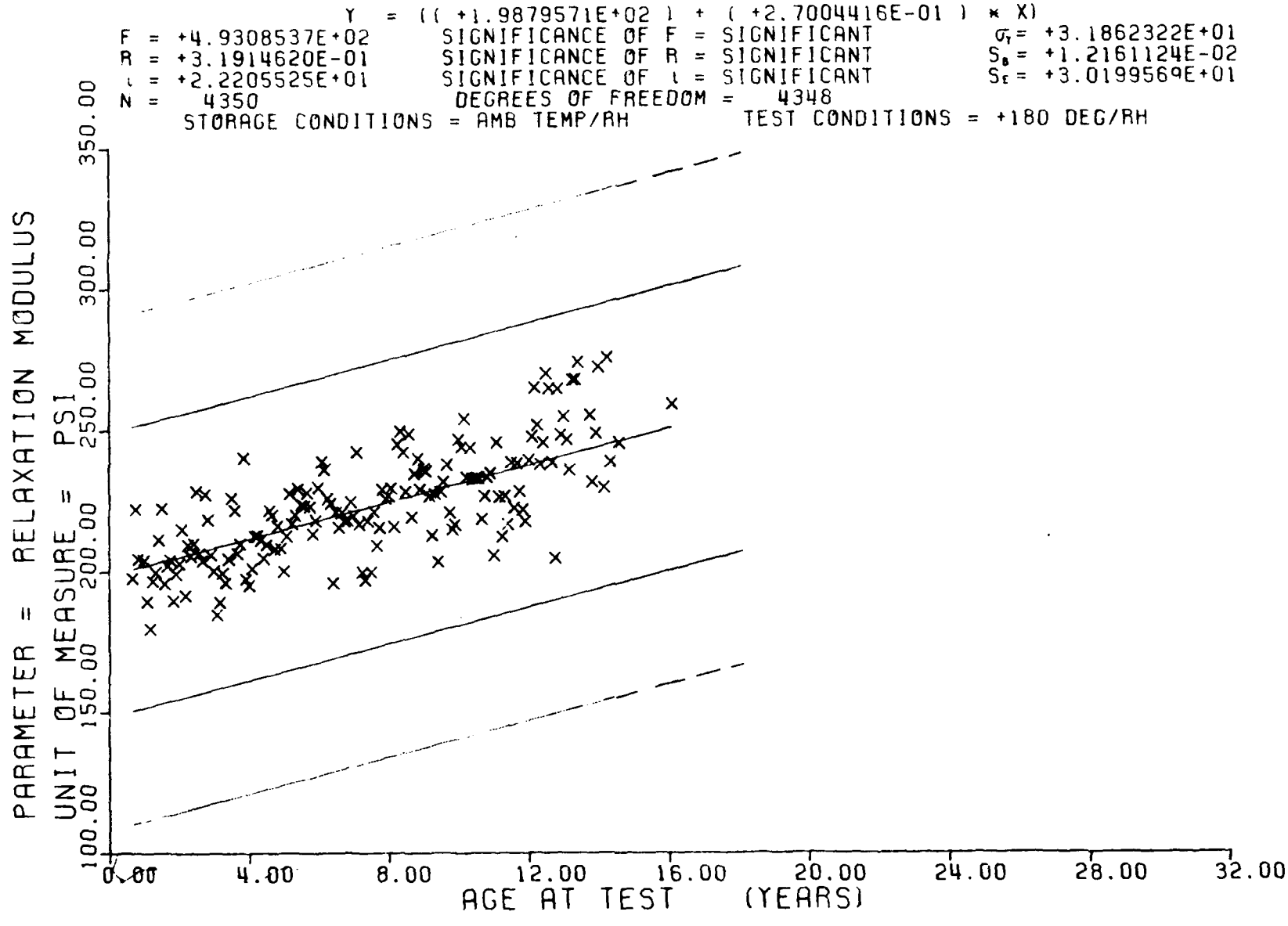
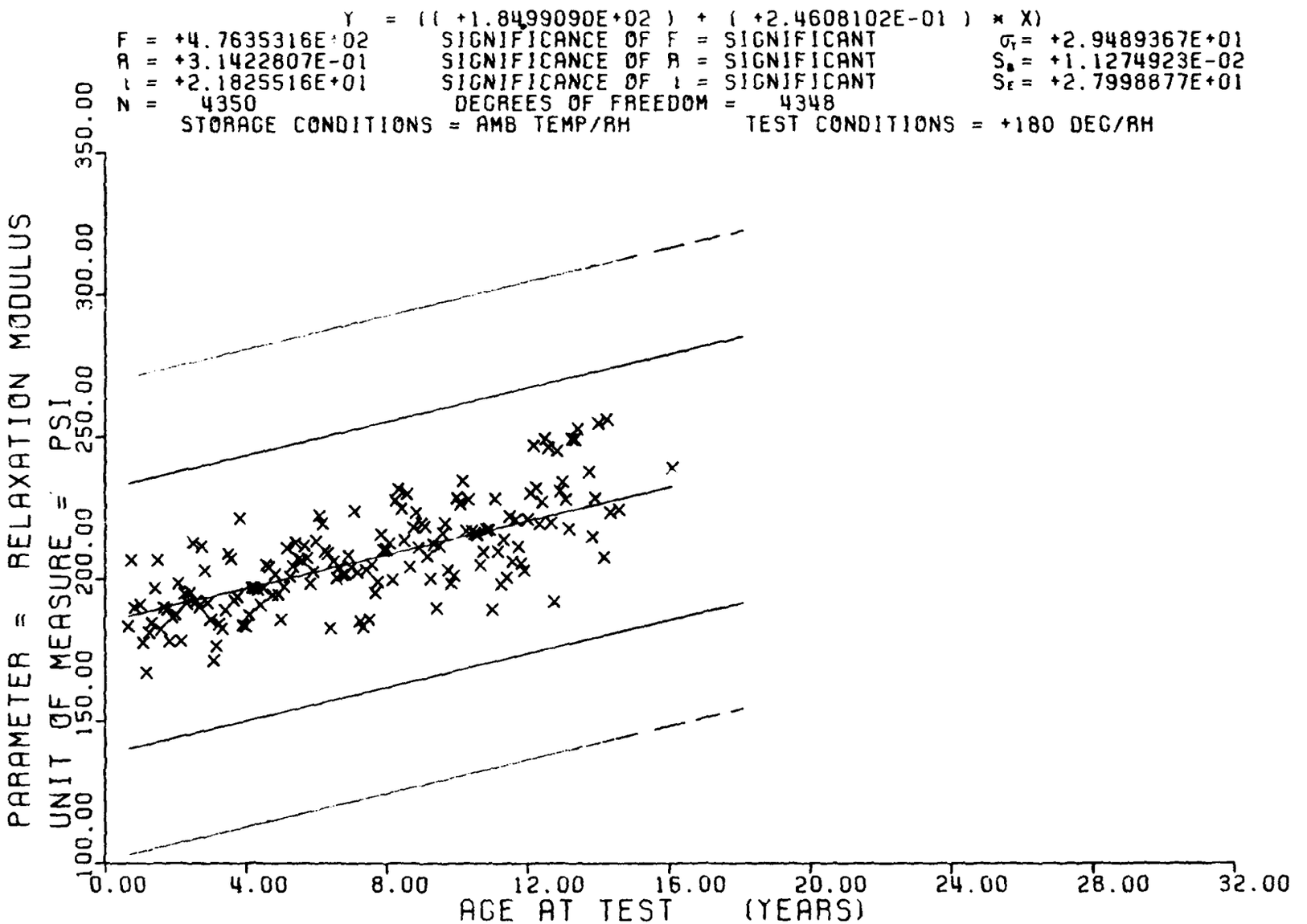

Y = ((+2.3449629E+02) + (+3.3422692E-01) * X)
F = +5.0975848E+02 SIGNIFICANCE OF F = SIGNIFICANT σ1 = +3.8851649E+01
R = +3.2393977E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +1.4803322E-02
t = +2.2577831E+01 SIGNIFICANCE OF t = SIGNIFICANT Se = +3.6760906E+01
N = 4350 DEGREES OF FREEDOM = 4348
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +180 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI
480.00
400.00
320.00
240.00
160.00
80.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6,STRESS RELAXATION MODULUS,3.0% STRAIN,10 SEC,180 DEG F,TPH-1011

Figure 48



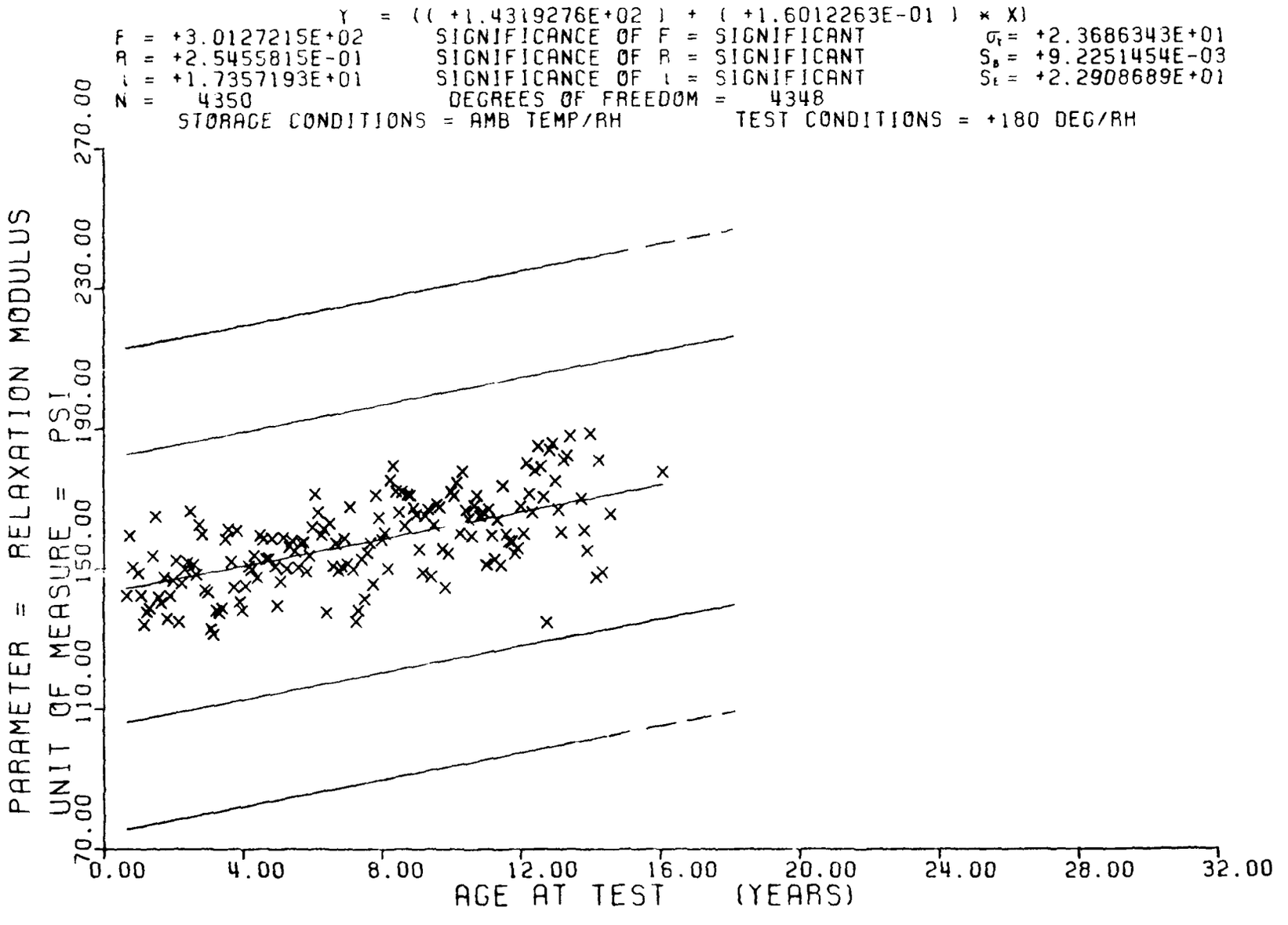
WING 6.STRESS RELAXATION MODULUS.3.0% STRAIN.50 SEC.180 DEG F.TPH-1011

Figure 49



WING 6.STRESS RELAXATION MODULUS,3.0% STRAIN,100 SEC,180 DEG F,TPH-101

Figure 50



WING 6.STRESS RELAXATION MODULUS,3.0% STRAIN,1000 SEC,180 DEG F,TPH-1011

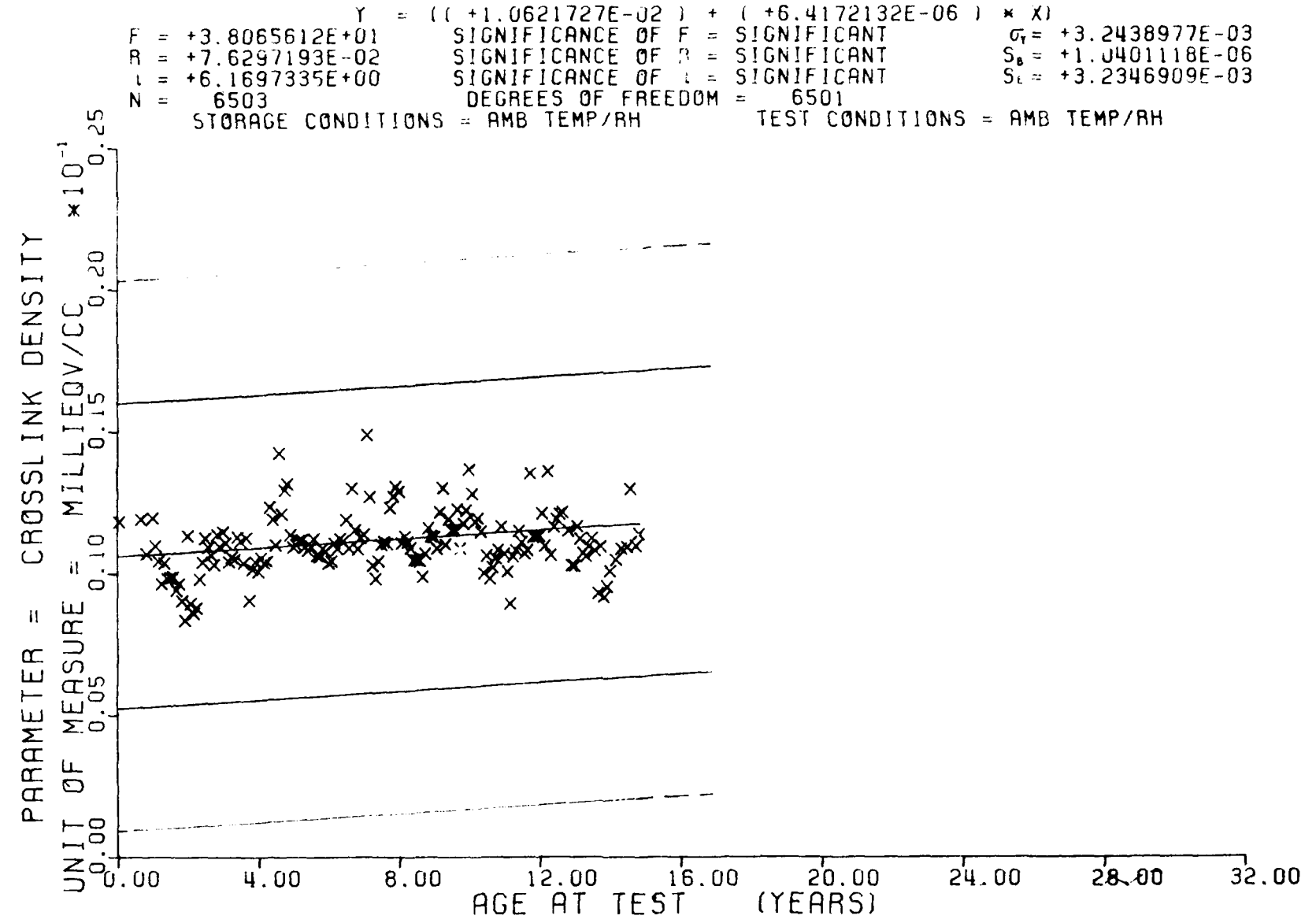
Figure 51

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	3	34	48	59	44	84	16	109	4	134	44
8	4	35	64	60	73	85	13	110	24	135	28
10	24	36	47	61	64	86	16	111	60	136	32
12	12	37	56	62	74	87	16	112	24	137	15
13	32	38	47	63	74	88	28	113	31	138	34
14	36	39	36	64	79	89	44	114	80	139	66
15	20	40	45	65	90	90	44	115	88	140	29
16	20	41	36	66	39	91	48	116	71	141	8
17	28	42	26	67	52	92	32	117	40	142	16
18	32	43	20	68	64	93	23	118	124	143	12
19	52	44	4	69	67	94	36	119	106	144	15
20	12	45	12	70	56	95	39	120	108	145	15
21	32	46	19	71	84	96	44	121	76	146	7
22	28	47	36	72	100	97	47	122	64	147	4
23	24	48	36	73	60	98	47	123	12	148	20
24	8	49	44	74	122	99	126	124	12	149	12
25	40	50	24	75	75	100	110	125	4	150	16
26	56	51	60	76	70	101	98	126	11	151	15
27	32	52	103	77	55	102	54	127	28	152	12
28	44	53	112	78	62	103	40	128	20	154	20
29	43	54	14	79	38	104	16	129	52	155	4
30	44	55	42	80	50	105	4	130	28	156	15
31	72	56	70	81	40	106	28	131	74	157	4
32	64	57	43	82	20	107	20	132	132	158	12
33	52	58	86	83	39	108	28	133	86	159	7
										160	19
										161	8
										162	7
										163	15
										164	3
										165	8
										166	4
										167	4
										168	7
										170	15
										172	16
										174	8
										175	8
										177	4
										178	4

STAGE 1, WING 6, TP-H1011, SOL GEL, CROSSLINK DENSITY

This sample size summary is applicable to figure 52



STAGE 1, WING 6, TP-H1011, SOL GEL, CROSSLINK DENSITY

Figure 52

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
2	3	27	29	53	72	78	75	103	12	128	15
3	15	28	34	54	42	79	20	104	15	129	9
4	10	29	59	55	34	80	54	105	6	130	60
5	11	30	31	56	74	81	51	106	15	131	102
6	25	31	51	57	84	82	32	107	15	132	21
7	18	32	67	58	60	83	38	108	9	133	24
8	24	33	56	59	40	84	25	109	39	134	39
9	24	34	61	60	53	85	33	110	36	135	24
10	40	35	39	61	72	86	27	111	18	136	12
11	24	36	32	62	99	87	39	112	28	137	30
12	40	37	43	63	94	88	32	113	114	138	87
13	51	38	29	64	92	89	55	114	53	139	63
14	52	39	48	65	37	90	57	115	57	140	29
15	52	40	36	66	37	91	48	116	51	141	21
16	63	41	12	67	62	92	32	117	110	142	24
17	15	42	24	68	82	93	19	118	37	143	75
18	65	43	24	69	65	94	40	119	63	144	9
19	28	44	16	70	83	95	45	120	84	145	13
20	28	46	31	71	40	96	50	121	51	146	18
21	17	47	30	72	39	97	98	122	12	147	6
22	22	48	37	73	85	98	75	123	9	148	6
23	11	49	64	74	72	99	47	124	3	149	17
24	19	50	17	75	74	100	39	125	9	150	3
25	64	51	60	76	70	101	27	126	3	151	9
26	22	52	90	77	43	102	14	127	3	152	9

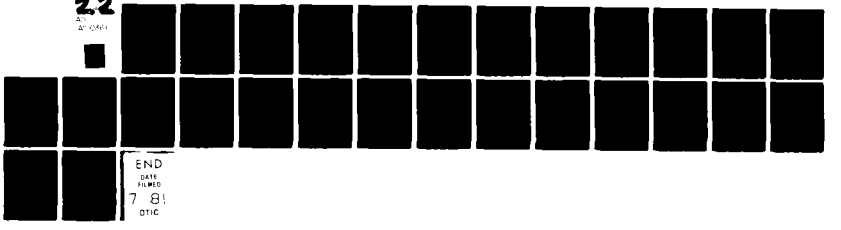
Age	Nr	Age	Nr
153	6	165	3
154	9	166	9
155	6	167	9
156	5	168	9
157	12	169	9
158	3	170	3
159	12	171	3
160	9	172	9
161	12	175	9
162	3		

STAGE 1 WING 6 TP-H 1011 CONSTANT STRAIN

This sample size summary is applicable to figure 53

AD-A100 361 OGDEN AIR LOGISTICS CENTER HILL AFB UT PROPELLANT AN--ETC F/G 21/9.2
PROPELLANT SURVEILLANCE REPORT, LGM-30F & G STAGE I, PHASE G, S--ETC(U)
MAY 81 J A THOMPSON

UNCLASSIFIED MANPA-458(81) NL



END
DATE FILMED
7 81
DTIC

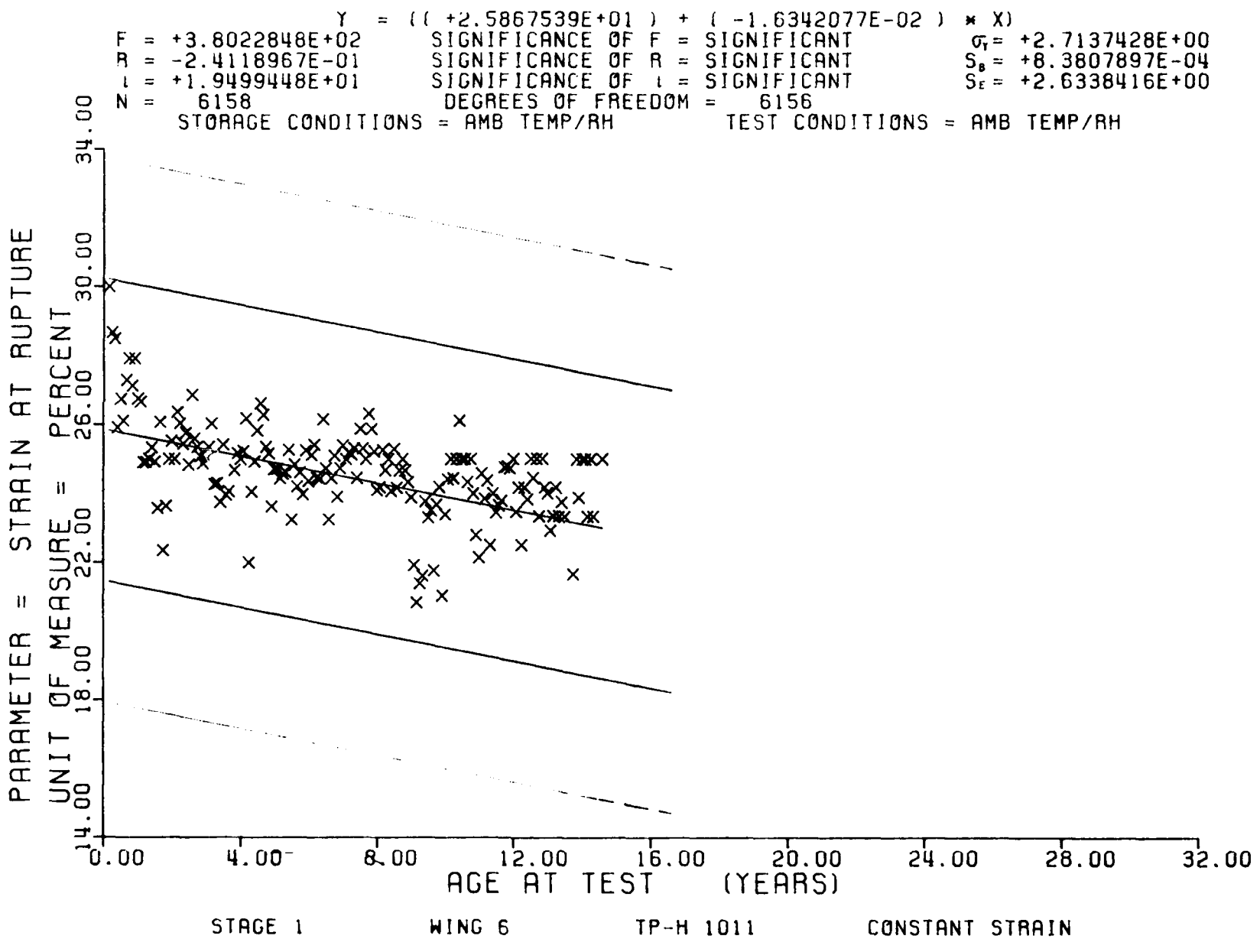

Y = ((+2.5867539E+01) + (-1.6342077E-02) * X)
F = +3.8022848E+02 SIGNIFICANCE OF F = SIGNIFICANT
R = -2.4118967E-01 SIGNIFICANCE OF R = SIGNIFICANT
t = +1.9499448E+01 SIGNIFICANCE OF t = SIGNIFICANT
N = 6158 DEGREES OF FREEDOM = 6156
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
σT = +2.7137428E+00
SB = +8.3807897E-04
SE = +2.6338416E+00
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = PERCENT
34.00
30.00
26.00
22.00
18.00
14.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
STAGE 1 WING 6 TP-H 1011 CONSTANT STRAIN

Figure 53

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	3	32	30	58	54	83	12	108	3	133	30
6	3	33	24	59	33	84	12	109	6	134	21
7	3	34	27	60	51	85	27	110	21	135	24
8	3	35	27	61	57	86	9	111	15	136	36
9	12	36	45	62	57	87	24	112	27	137	18
10	6	37	18	63	81	88	36	113	54	138	64
12	12	38	21	64	42	89	36	114	27	139	48
13	15	39	45	65	9	90	51	115	9	140	30
14	6	40	15	66	36	91	27	116	42	141	18
15	30	41	21	67	42	92	33	117	39	142	9
16	18	42	6	68	60	93	18	118	9	143	6
17	15	43	6	69	86	94	27	119	12	144	21
18	15	44	9	70	105	95	27	120	30	145	6
19	6	46	12	71	36	96	15	121	9	146	15
20	2	47	9	72	54	97	93	122	6	147	3
21	15	48	51	73	51	98	75	123	21	148	6
22	3	49	45	74	51	99	57	124	21	149	9
24	27	50	51	75	48	100	51	125	27	150	15
25	21	51	57	76	30	101	9	126	21	151	3
26	39	52	72	77	27	102	15	127	36	152	6
27	12	53	27	78	27	103	12	128	36	154	9
28	21	54	24	79	21	104	18	129	27	155	3
29	24	55	39	80	15	105	3	130	45	156	12
30	21	56	60	81	41	106	3	131	44	157	12
31	39	57	69	82	18	107	18	132	21	158	6
										159	6
										160	12
										161	9
										162	3
										164	3
										165	3
										166	6
										167	3
										168	6
										171	3

STAGE 1 WING 6 TP-H 1011 SHORE A, 10 SECOND HARDNESS

This sample size summary is applicable to figure 54

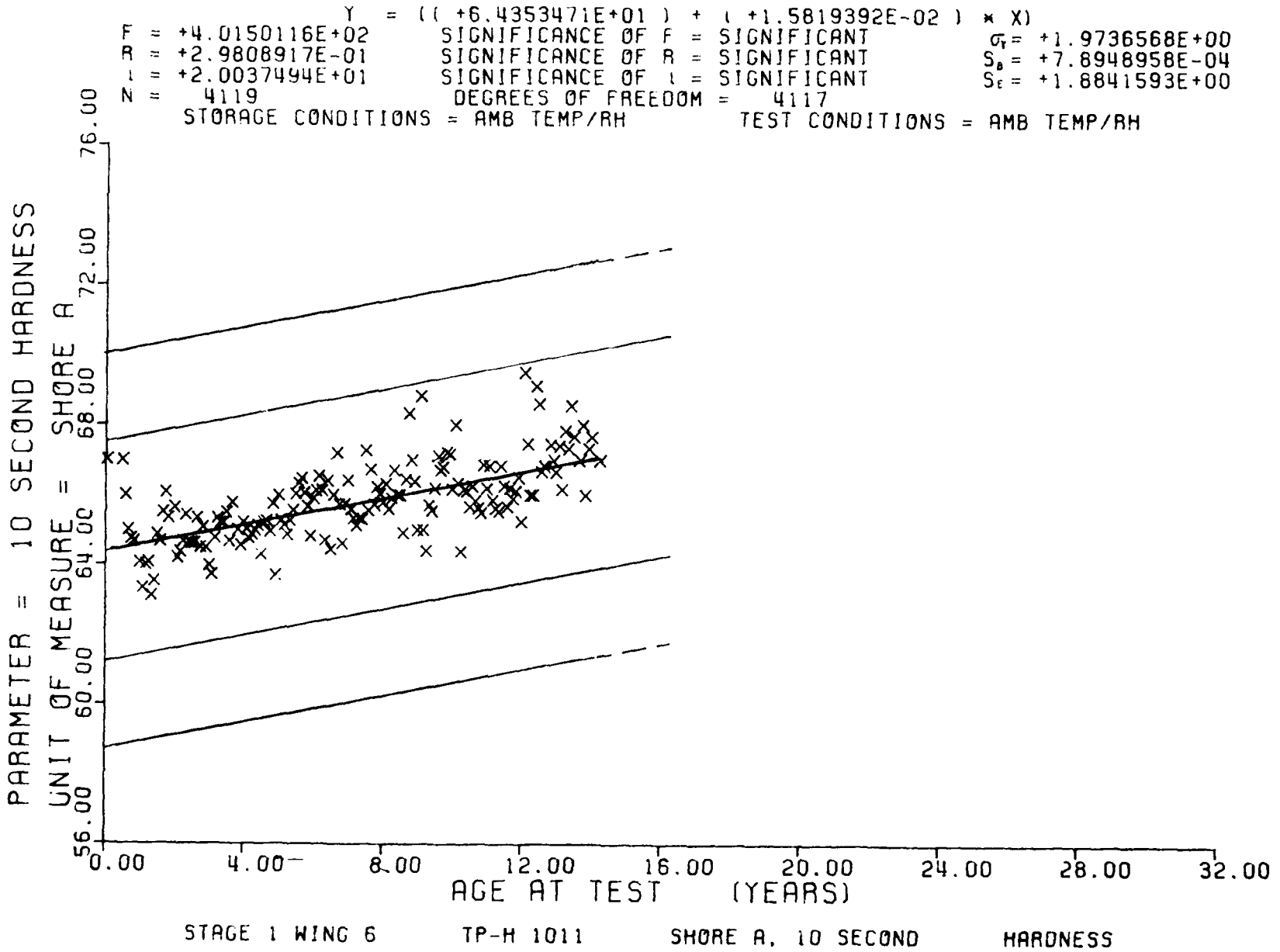

Y = ((+6.4353471E+01) + (+1.5819392E-02) * X)
F = +4.0150116E+02 SIGNIFICANCE OF F = SIGNIFICANT
R = +2.9808917E-01 SIGNIFICANCE OF R = SIGNIFICANT
I = +2.0037494E+01 SIGNIFICANCE OF I = SIGNIFICANT
N = 4119 DEGREES OF FREEDOM = 4117
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
σt = +1.9736568E+00
Sb = +7.8948958E-04
Se = +1.8841593E+00
PARAMETER = 10 SECOND HARDNESS
UNIT OF MEASURE = SHORE A
76.00
72.00
68.00
64.00
60.00
56.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
STAGE 1 WING 6 TP-H 1011 SHORE A, 10 SECOND HARDNESS

Figure 54

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
9	3	34	39	59	57	84	9	115	56
10	15	35	50	60	43	85	3	116	55
11	1	36	39	61	34	86	3	117	7
12	6	37	13	62	79	87	3	118	10
13	15	38	11	63	46	88	12	120	39
14	13	39	16	64	80	89	24	121	12
15	16	40	11	65	72	90	36	129	3
16	17	41	13	66	38	91	24	130	36
17	18	42	30	67	59	92	9	131	33
18	19	43	4	68	38	93	17	132	5
19	22	44	10	69	40	94	15	133	6
20	35	45	7	70	46	95	19	134	18
21	16	46	12	71	11	96	33	135	25
22	19	47	16	72	24	97	77	136	3
23	21	48	4	73	17	98	64	139	12
24	19	49	36	74	28	99	49	140	12
25	25	50	13	75	51	100	26		
26	27	51	38	76	26	101	21		
27	36	52	39	77	22	102	8		
28	38	53	47	78	13	103	6		
29	43	54	37	79	7	105	9		
30	24	55	25	80	21	106	6		
31	51	56	21	81	24	108	3		
32	42	57	25	82	7	113	3		
33	54	58	22	83	9	114	11		

STAGE 1 WING 6 TP-H 1011 MAXIMUM PRESSURE PRESSURE TIME

This sample size summary is applicable to figures 55 and 56

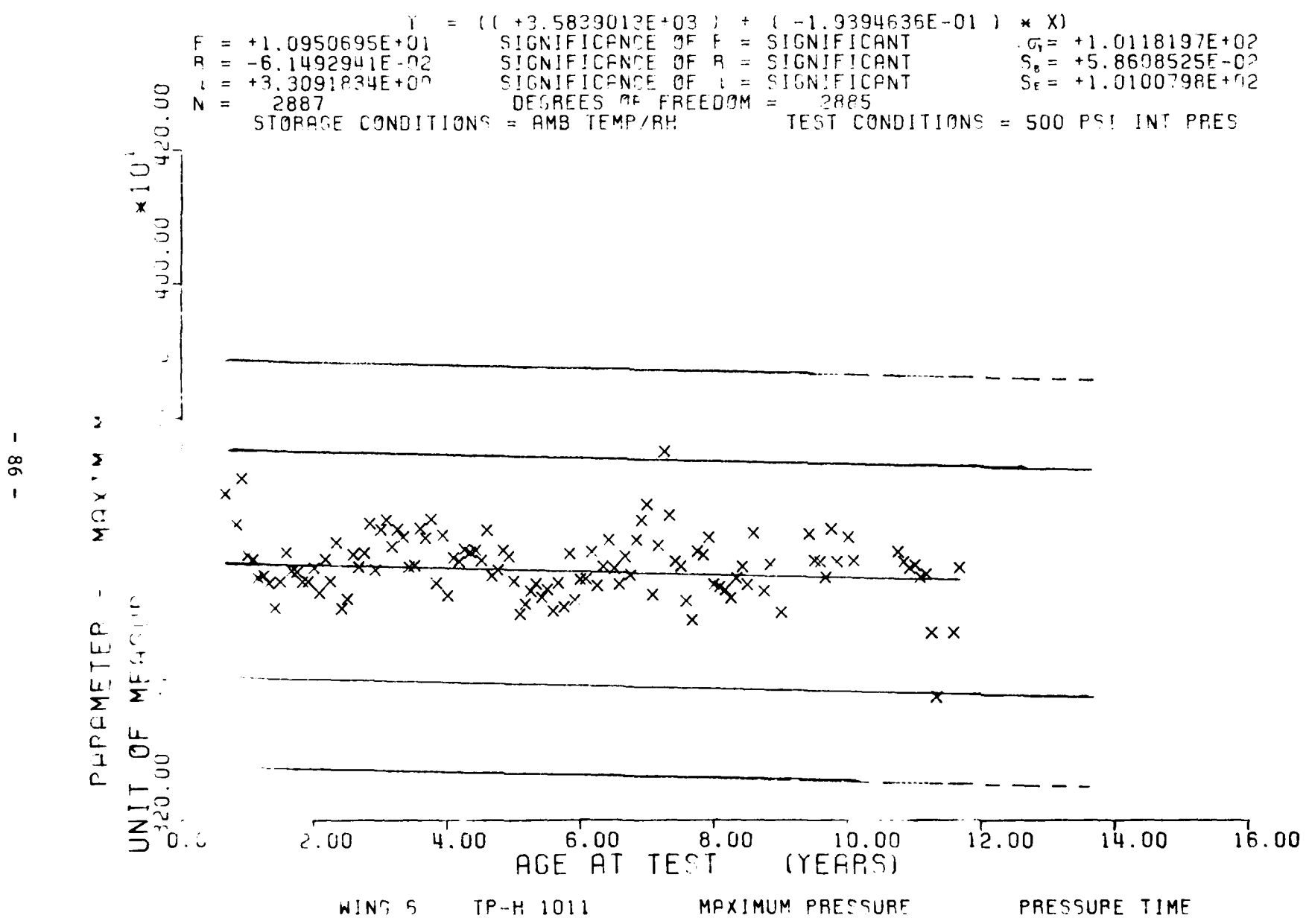
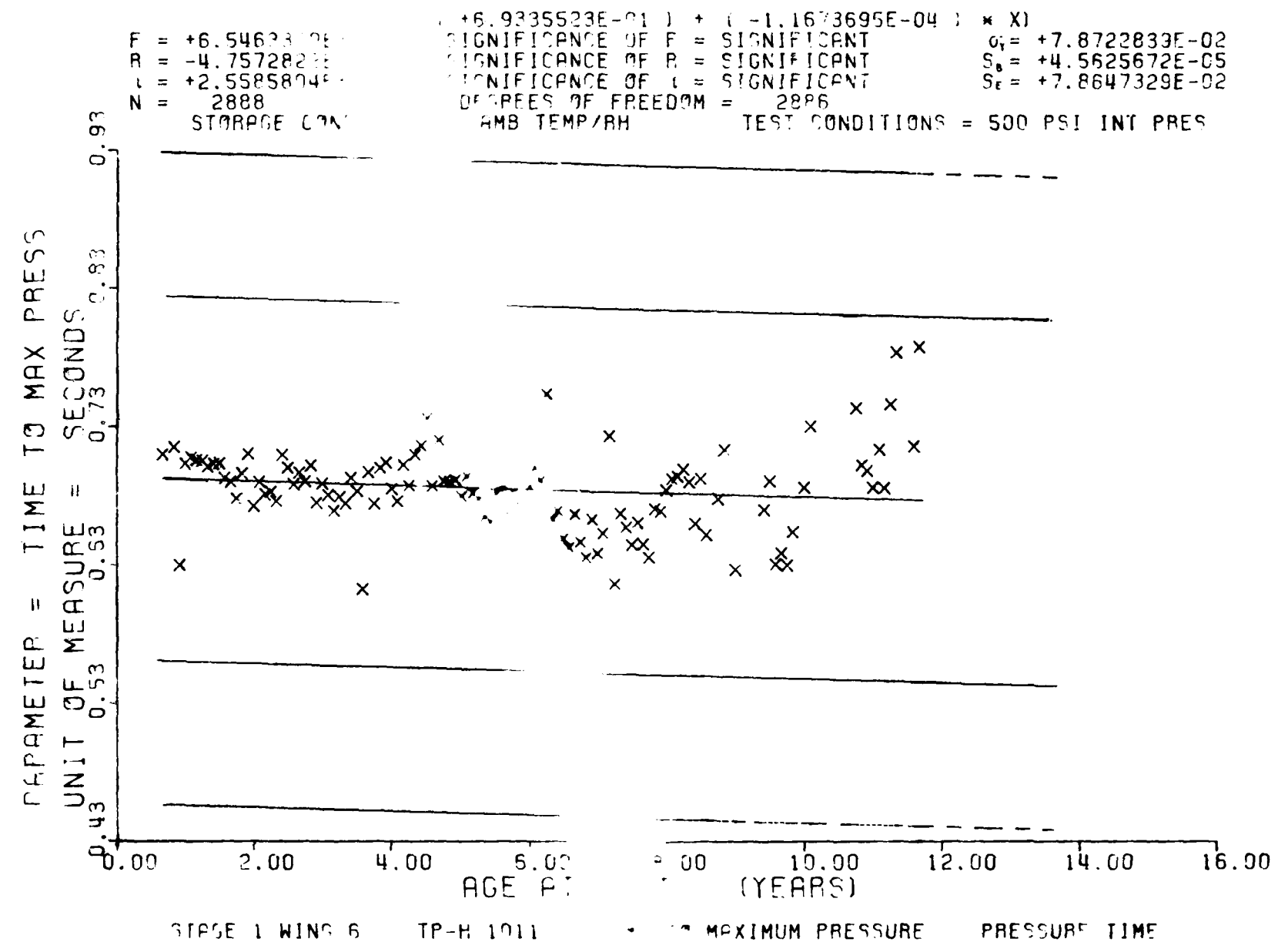

Y = ((+3.5839013E+03) + (-1.9394636E-01) * X)
F = +1.0950695E+01 SIGNIFICANCE OF F = SIGNIFICANT
R = -6.1492941E-02 SIGNIFICANCE OF R = SIGNIFICANT
N = 2887 DEGREES OF FREEDOM = 2885
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 500 PSI INT PRES
*10
420.00
400.00
320.00
0.0
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 6 TP-H 1011 MAXIMUM PRESSURE PRESSURE TIME

Figure 55


(+6.9335523E-01) + (-1.1673695E-04) × X)
F = +6.54633
R = -4.7572823
t = +2.5585804
N = 2888
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 2886
σ_Y = +7.8722833E-02
S_B = +4.5625672E-05
S_E = +7.8647329E-02
STORAGE CON
AMB TEMP/RH
TEST CONDITIONS = 500 PSI INT PRES
PARAMETER = TIME TO MAX PRESS
UNIT OF MEASURE = SECONDS
0.93
0.83
0.73
0.63
0.53
0.43
0.00
2.00
4.00
6.00
10.00
12.00
14.00
16.00
AGE AT
(YEARS)
STAGE 1 WING 6
TP-H 1011
MAXIMUM PRESSURE
PRESSURE TIME

Figure

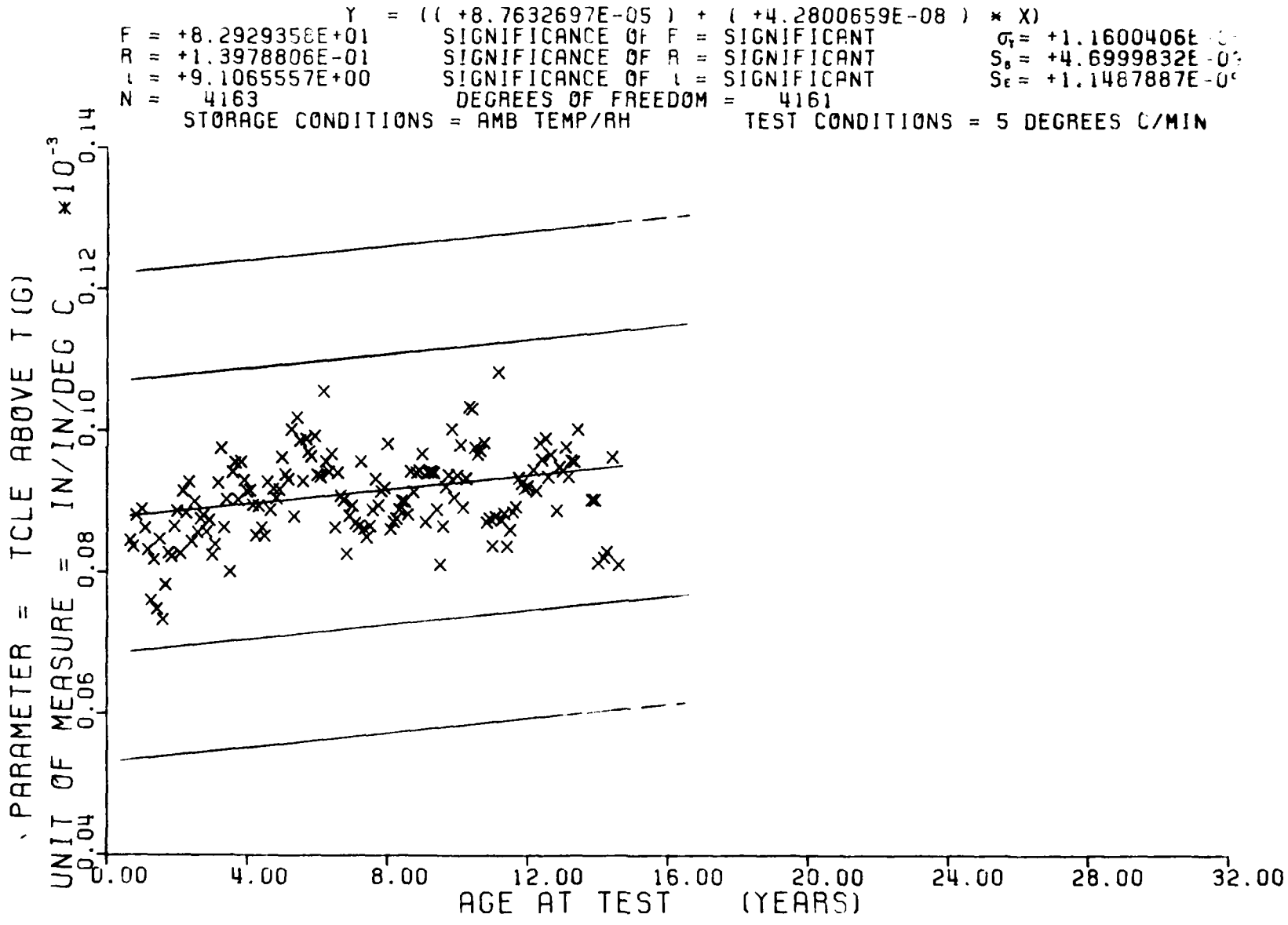
*** SAMPLE SIZE SUMMA ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
8	3	34	48	59	39	84	17	109	10	134	37
9	10	35	39	60	60	85	1[illegible]	110	24	135	14
10	7	36	30	61	53	86	11	111	9	136	13
12	22	37	53	62	45	87	12	[illegible]	15	137	11
13	29	38	18	63	40	88	9	[illegible]	18	138	64
14	15	39	32	64	33	89	22	[illegible]	22	139	47
15	21	40	27	65	50	90	21		22	140	14
16	24	41	21	66	35	91	17		19	141	6
17	9	42	15	67	34	92	9	[illegible]	110	142	30
18	33	43	12	68	49	93	27	[illegible]	65	143	49
19	4	44	19	69	97	94	27	[illegible]	15	144	6
20	8	45	9	70	61	95	49	[illegible]	19	146	6
21	25	46	3	71	29	96	54	[illegible]	11	147	4
22	24	47	56	72	37	97	49	[illegible]	28	148	4
23	12	48	32	73	35	98	104	[illegible]	8	149	8
24	18	49	42	74	23	99	66	[illegible]	23	150	8
25	42	50	25	75	41	100	25	[illegible]	31	151	6
26	15	51	64	76	25	101	10	126	9	152	4
27	27	52	66	77	20	102	14	127	31	154	4
28	24	53	80	78	37	103	13	128	26	155	4
29	39	54	15	79	16	104	9	129	10	156	6
30	42	55	39	80	32	105	13	130	41	157	2
31	48	56	51	81	55	106	17	131	[illegible]	158	4
32	54	57	45	82	16	107	8	132	[illegible]	159	2
33	39	58	69	83	22	108	10	133	[illegible]	160	2
										161	2
										166	2
										167	4

STAGE 1, WING 6, TP-H1011, THERMAL COEFFICIENT OF LINEAR EXPANSION AT -VE TG

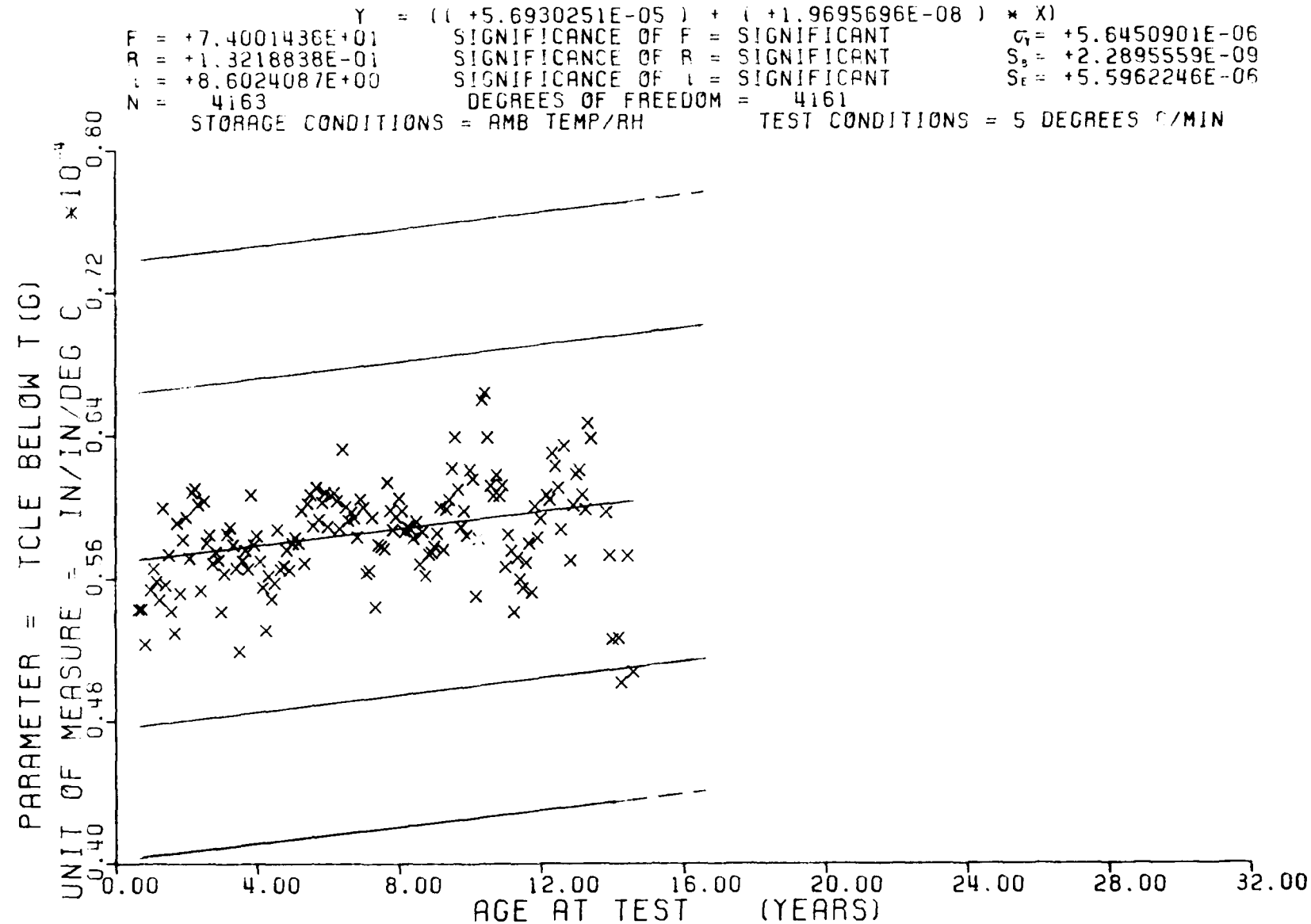
168	4
170	6
171	4
173	4
175	6

This sample size summary is applicable to figures 57 and 58



STAGE 1, WING 6, TP-H1011, THERMAL COEFFICIENT OF LINEAR EXPANSION ABOVE TG

Figure 57



STAGE 1. WING 6. IP-H1011 THERMAL COEFFICIENT OF LINEAR EXPANSION BELOW TG

Figure 58

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	3	37	13	65	14	94	4	121	16	147	8
10	1	38	4	66	23	95	9	122	16	149	8
11	1	39	7	67	34	96	20	123	8	150	4
13	1	40	5	68	20	97	22	124	2	151	10
15	1	41	17	69	16	98	28	125	2	152	4
16	1	42	5	70	31	99	25	126	2	153	2
18	7	43	2	71	10	100	8	127	2	154	4
19	2	44	2	72	14	101	4	128	2	155	6
20	4	45	3	73	20	102	5	130	4	156	6
21	4	46	3	74	14	103	10	131	12	157	6
22	20	47	1	75	14	104	11	132	8	158	4
23	4	48	4	76	1	105	6	133	7	159	6
24	1	49	3	79	6	106	4	134	8	160	4
25	6	50	3	81	8	108	4	135	4	161	6
26	14	51	3	82	2	109	2	136	4	162	1
27	2	53	3	84	2	110	2	137	4	163	2
28	4	56	3	85	4	111	4	138	2	165	2
29	14	57	9	86	8	112	2	139	4	166	4
30	12	58	4	87	3	113	8	140	6	167	4
31	10	59	13	88	6	114	2	141	2	169	2
32	3	60	18	89	2	115	6	142	12	171	2
33	6	61	23	90	4	116	4	143	4	172	2
34	10	62	21	91	5	117	4	144	4	192	2
35	9	63	32	92	6	118	4	145	2		
36	22	64	23	93	2	120	8	146	8		

STAGE I WING 6 TGA IGNITION TEMPERATURE, 9 DEGREE C RISE/MINUTE

This sample size summary is applicable to figures 59 and 60

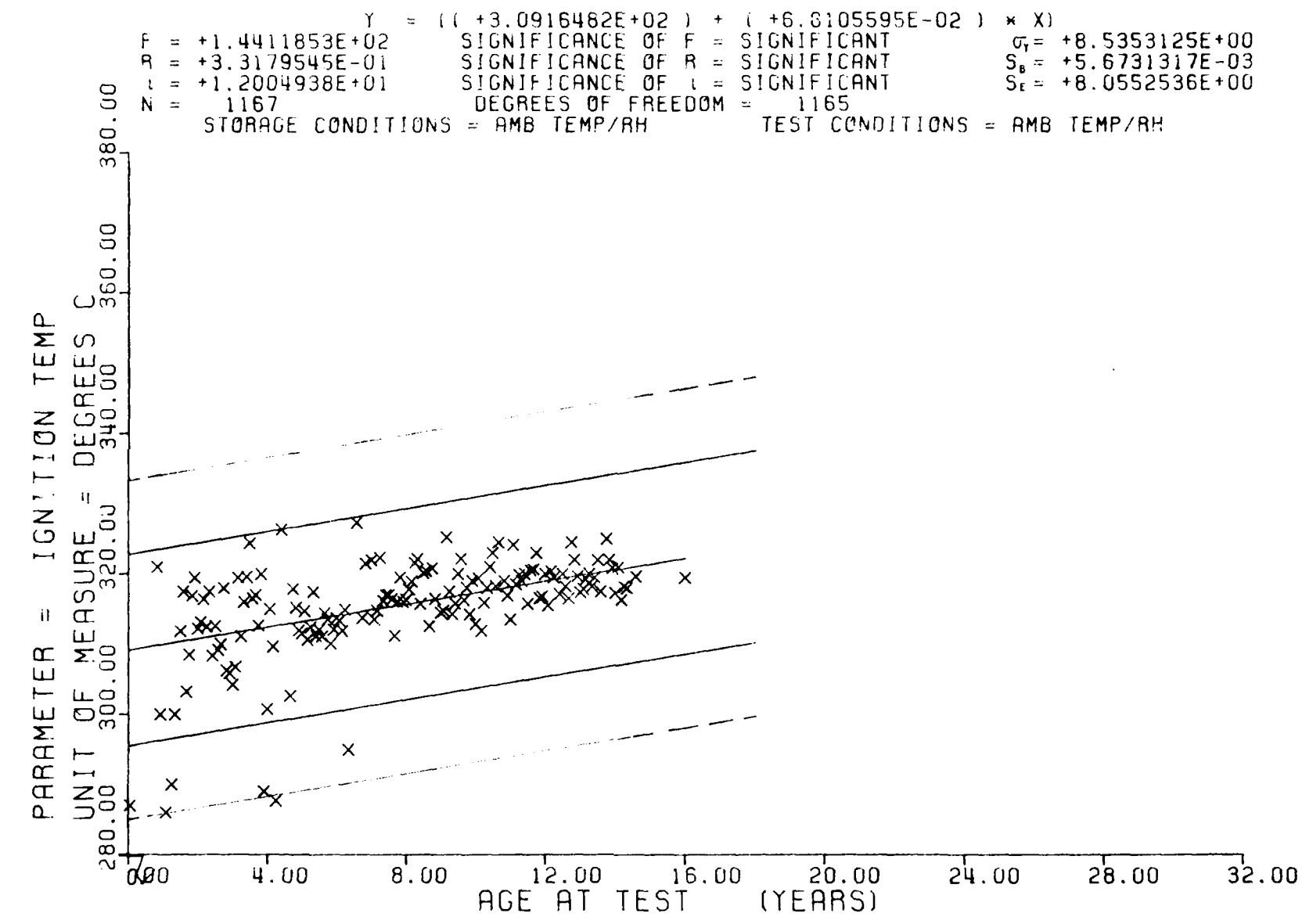

Y = ((+3.0916482E+02) + (+6.8105595E-02) × X)
F = +1.4411853E+02 SIGNIFICANCE OF F = SIGNIFICANT σY = +8.5353125E+00
R = +3.3179545E-01 SIGNIFICANCE OF R = SIGNIFICANT SB = +5.6731317E-03
N = 1167 DEGREES OF FREEDOM = 1165 SE = +8.0552536E+00
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = IGN'TION TEMP
UNIT OF MEASURE = DEGREES C
280.00
300.00
320.00
340.00
360.00
380.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
STAGE I WING 6
TGA IGNITION TEMPERATURE, 9 DEGREE C RISE/MINUTE

Figure 59

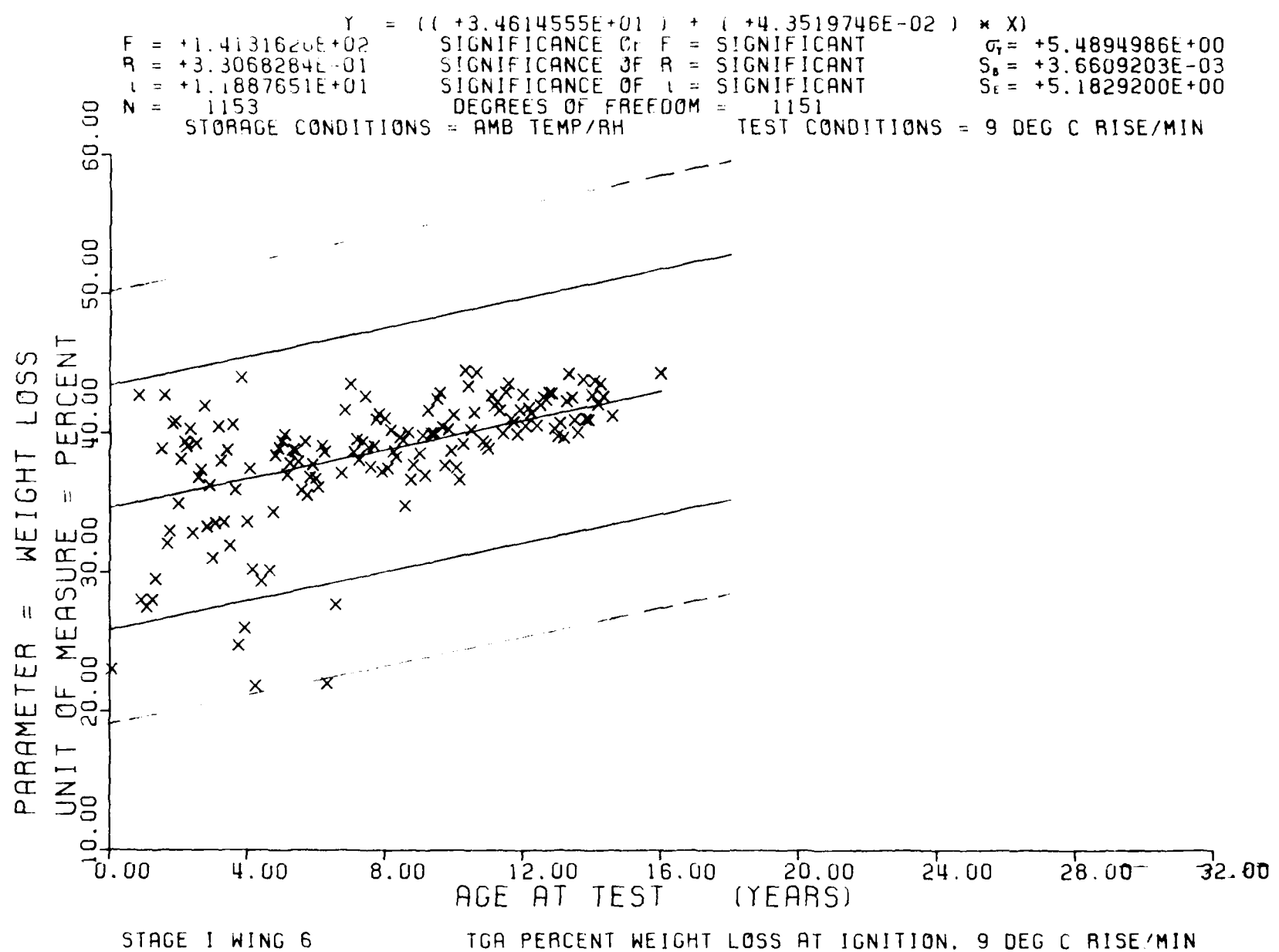

Y = ((+3.4614555E+01) + (+4.3519746E-02) × X)
F = +1.4131626E+02 SIGNIFICANCE OF F = SIGNIFICANT σT = +5.4894986E+00
R = +3.3068284E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +3.6609203E-03
t = +1.1887651E+01 SIGNIFICANCE OF t = SIGNIFICANT SE = +5.1829200E+00
N = 1153 DEGREES OF FREEDOM = 1151
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 9 DEG C RISE/MIN
PARAMETER = WEIGHT LOSS
UNIT OF MEASURE = PERCENT
10.00
20.00
30.00
40.00
50.00
60.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
STAGE I WING 6 TGA PERCENT WEIGHT LOSS AT IGNITION, 9 DEG C RISE/MIN

Figure 60

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
[illegible]	[illegible]	[illegible]	29	55	15	80	34	105	8	130	62
[illegible]	[illegible]	31	28	56	32	81	35	106	15	131	39
[illegible]	11	[illegible]	[illegible]	57	27	82	30	107	6	132	24
[illegible]	14	[illegible]	19	58	41	83	30	108	14	133	16
[illegible]	12	34	33	59	33	84	18	109	15	134	6
10	[illegible]	[illegible]	24	60	44	85	20	110	4	135	12
11	[illegible]	[illegible]	35	61	41	86	16	111	6	136	8
[illegible]	[illegible]	[illegible]	24	62	35	87	19	112	14	137	8
[illegible]	[illegible]	[illegible]	9	63	47	88	20	113	37	138	10
14	[illegible]	[illegible]	22	64	25	89	32	114	58	139	6
[illegible]	[illegible]	40	21	65	30	90	32	115	35	140	10
16	29	41	5	66	30	91	13	116	11	141	8
[illegible]	14	[illegible]	11	67	59	92	14	117	25	142	20
[illegible]	30	[illegible]	12	68	30	93	15	118	42	143	40
[illegible]	10	44	6	69	40	94	21	119	2	144	16
20	11	45	9	70	70	95	10	120	16	146	12
21	24	46	15	71	48	96	31	121	12	147	6
[illegible]	16	47	47	72	30	97	41	122	13	148	2
23	13	48	41	73	32	98	38	123	3	149	16
24	[illegible]	[illegible]	38	74	36	99	27	124	8	151	4
[illegible]	27	50	27	75	36	100	22	125	17	152	2
[illegible]	20	51	23	76	18	101	19	126	17	153	2
27	21	52	29	77	9	102	10	127	5	154	2
[illegible]	[illegible]	53	34	78	22	103	20	128	23	155	8
[illegible]	20	54	11	79	26	104	12	129	11	156	4
										157	5
										159	4
										160	2

STAGE 1 WING 6, TP-H 1011, DTA, ENDOTHERM 1, 12 DEGREE CENTIGRADE RISE/MIN

161	4
162	4
163	2
170	2

This sample size summary is applicable to figures 61 and 62

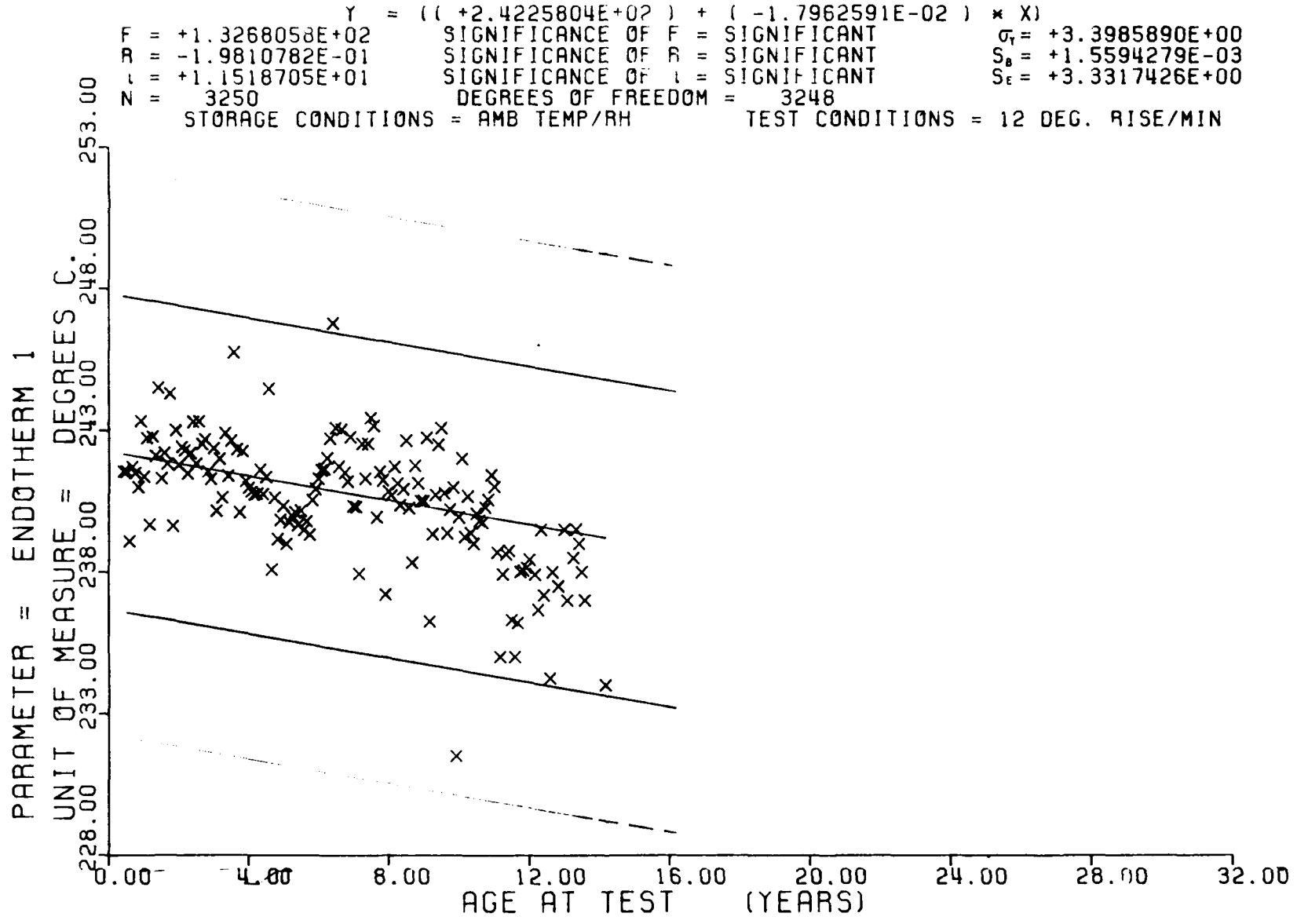

Y = ((+2.4225804E+02) + (-1.7962591E-02) * X)
F = +1.3268058E+02 SIGNIFICANCE OF F = SIGNIFICANT σY = +3.3985890E+00
R = -1.9810782E-01 SIGNIFICANCE OF R = SIGNIFICANT Sβ = +1.5594279E-03
t = +1.1518705E+01 SIGNIFICANCE OF t = SIGNIFICANT Sε = +3.3317426E+00
N = 3250 DEGREES OF FREEDOM = 3248
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 12 DEG. RISE/MIN
PARAMETER = ENDOTHERM 1
UNIT OF MEASURE = DEGREES C.
253.00
248.00
243.00
238.00
233.00
228.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
STAGE 1 WING 6, TP-H 1011, DTA, ENDOTHERM 1, 12 DEGREE CENTIGRADE RISE/MIN

Figure 61

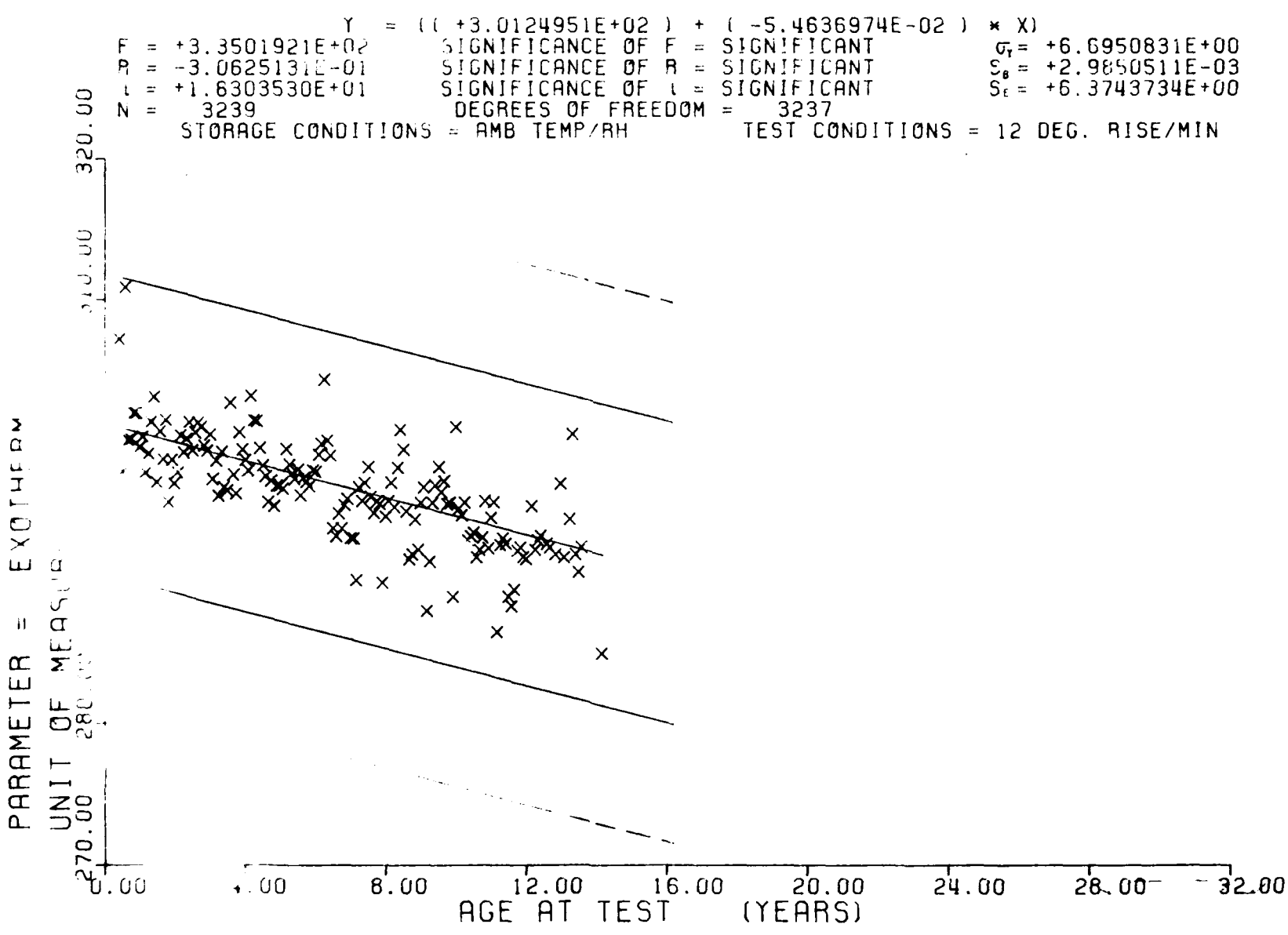

Y = ((+3.0124951E+02) + (-5.4636974E-02) * X)
F = +3.3501921E+02 SIGNIFICANCE OF F = SIGNIFICANT σT = +6.6950831E+00
R = -3.0625131E-01 SIGNIFICANCE OF R = SIGNIFICANT Sθ = +2.9850511E-03
t = +1.6303530E+01 SIGNIFICANCE OF t = SIGNIFICANT Sε = +6.3743734E+00
N = 3239 DEGREES OF FREEDOM = 3237
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 12 DEG. RISE/MIN
320.00
270.00
0.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
PARAMETER = EXOTHERM
UNIT OF MEASURE
STAGE 6. TP-H 1011. DTA. EXOTHERM 1. 12 DEGREE CENTIGRADE RISE/MIN

Figure 62

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
8	3	34	26	[illegible]	29	84	16	109	15	134	5
9	5	35	21	[illegible]	42	85	16	110	4	135	10
10	3	36	29	[illegible]	34	86	15	111	6	136	8
12	17	37	19	[illegible]	28	87	17	112	11	137	7
13	10	38	7	[illegible]	36	88	18	113	35	138	9
14	9	39	18	[illegible]	16	89	32	114	57	139	6
15	5	40	19	[illegible]	22	90	31	115	31	140	10
16	22	41	5	[illegible]	24	91	13	116	9	141	7
17	14	42	11	[illegible]	48	92	13	117	24	142	16
18	18	43	10	[illegible]	26	93	14	118	41	143	35
19	4	44	4	[illegible]	[illegible]	94	20	119	2	144	14
20	11	45	9	[illegible]	[illegible]	95	9	120	12	146	11
21	22	46	9	[illegible]	[illegible]	96	28	121	12	147	5
22	13	47	42	[illegible]	[illegible]	97	33	122	13	148	2
23	10	48	31	[illegible]	[illegible]	98	36	123	3	149	15
24	9	49	30	[illegible]	[illegible]	99	25	124	9	151	3
25	20	50	17	[illegible]	[illegible]	100	18	125	17	152	2
26	16	51	14	[illegible]	[illegible]	101	17	126	16	153	2
27	12	52	18	[illegible]	[illegible]	102	10	127	5	154	2
28	19	53	25	[illegible]	[illegible]	103	18	128	19	155	8
29	16	54	9	[illegible]	[illegible]	104	11	129	10	156	4
30	22	55	15	[illegible]	[illegible]	105	7	130	50	157	4
31	21	56	30	[illegible]	[illegible]	106	15	131	37	159	4
32	22	57	25	[illegible]	[illegible]	107	4	132	22	160	1
33	11	58	27	[illegible]	[illegible]	108	12	133	14	161	4
										162	3
										163	2
										170	2

STAGE 1 WING 6, TP-H 1011, DTA, [illegible], 12 DEGREE CENTIGRADE RISE/MIN

This sample size summary is applicable to fir

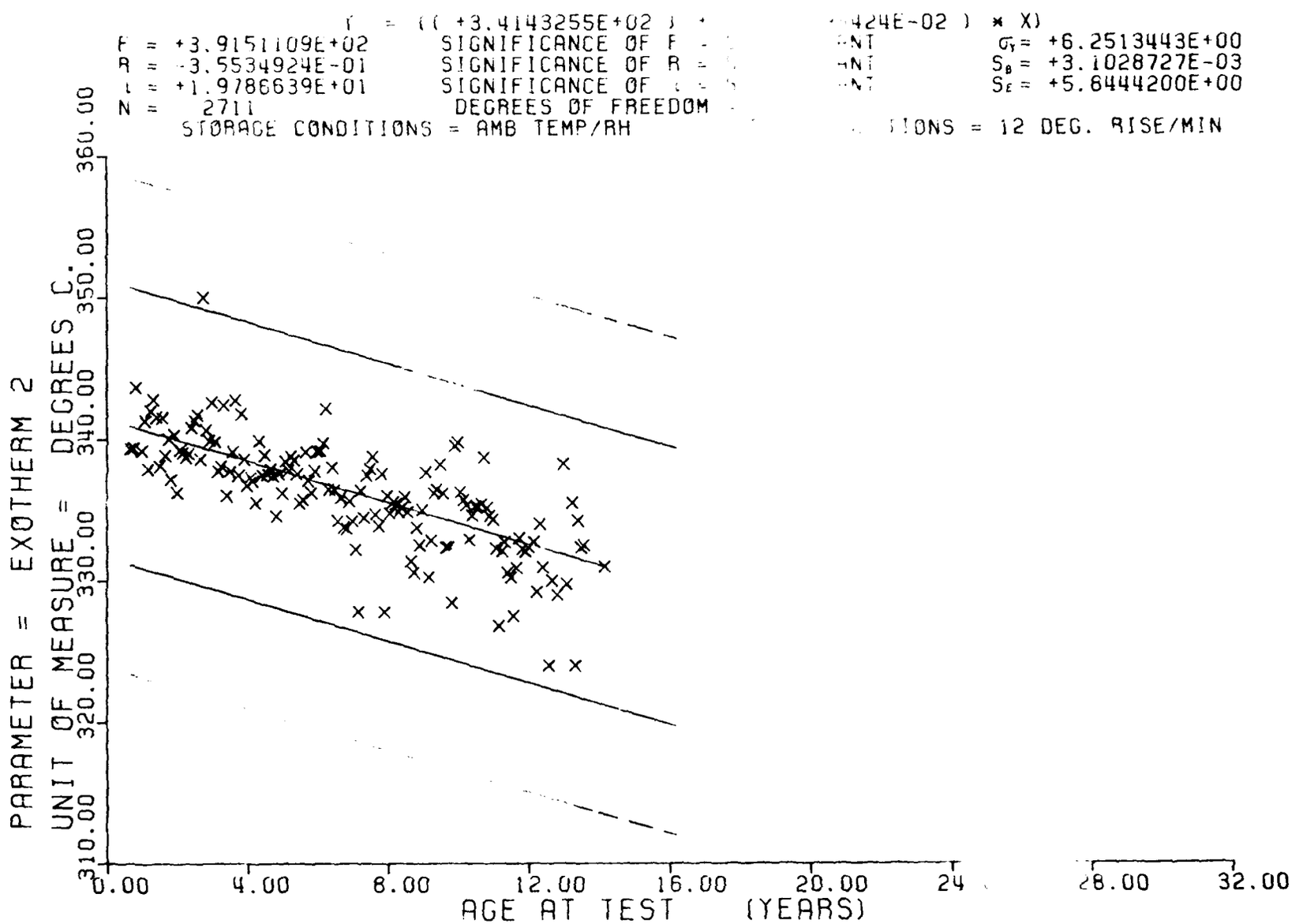

Y = ((+3.4143255E+02) + (-424E-02) * X)
F = +3.9151109E+02 SIGNIFICANCE OF F = ANT σY = +6.2513443E+00
R = -3.5534924E-01 SIGNIFICANCE OF R = ANT Sβ = +3.1028727E-03
t = +1.9786639E+01 SIGNIFICANCE OF t = ANT Sε = +5.8444200E+00
N = 2711 DEGREES OF FREEDOM
STORAGE CONDITIONS = AMB TEMP/RH ITIONS = 12 DEG. RISE/MIN
PARAMETER = EXOTHERM 2
UNIT OF MEASURE = DEGREES C.
360.00
350.00
340.00
330.00
320.00
310.00
0.00
4.00
8.00
12.00
16.00
20.00
24
28.00
32.00
AGE AT TEST (YEARS)
STAGE 1 WING 6. TP-H 1011. DTA. EXOTHERM 2. 12 DEGREE CENTIG RISE/MIN

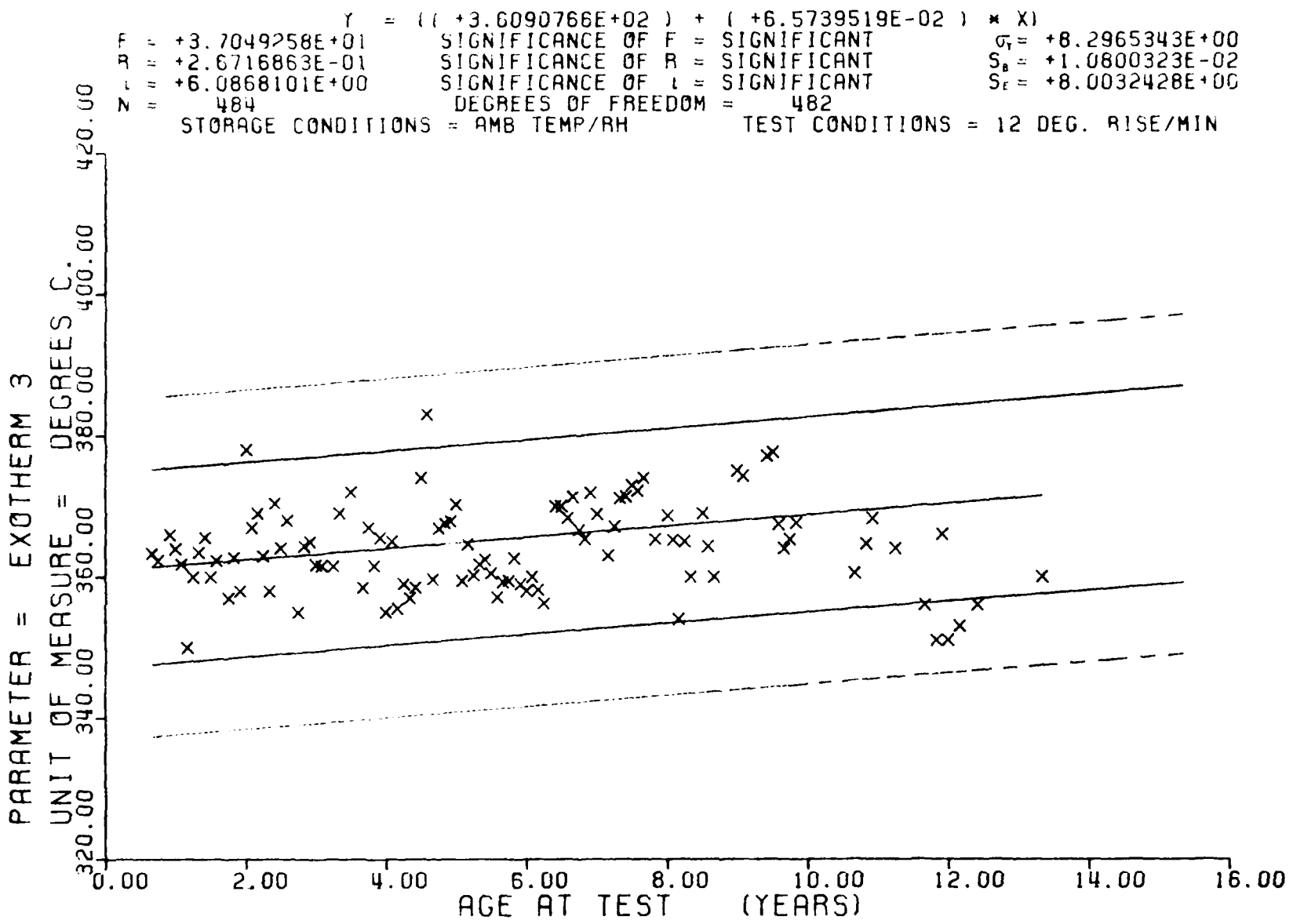
Figure 63

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
8	7	36	4	64	4	91	6	144	1
9	7	37	5	65	7	92	2	146	1
11	3	39	2	66	4	94	3	149	1
12	4	40	5	67	9	96	6	155	1
13	5	42	3	68	4	97	4	160	1
14	3	44	2	69	7	98	1		
15	1	45	1	70	3	99	1		
16	4	46	5	71	2	100	1		
17	5	47	7	72	4	104	1		
18	5	48	8	73	4	108	3		
19	6	49	2	74	6	109	4		
21	2	50	2	75	8	110	1		
22	4	51	1	77	1	113	11		
23	1	52	3	78	3	114	21		
24	1	53	4	79	18	115	7		
25	1	54	1	80	12	116	2		
26	2	55	1	81	10	117	3		
27	4	56	3	82	8	118	3		
28	3	57	7	83	8	128	2		
29	5	58	5	84	7	130	9		
30	9	59	7	86	1	131	4		
31	4	60	4	87	8	135	3		
33	4	61	7	88	8	140	1		
34	5	62	6	89	16	142	2		
35	4	63	5	90	12	143	4		

STAGE 1 WING 6, TP-H 1011, DTA, EXOTHERM 3, 12 DEGREE CENTIGRADE RISE/MIN

This sample size summary is applicable to figure 64



STAGE 1 WING 6, TP-H 1011, DTA, EXOTHERM 3, 12 DEGREE CENTIGRADE RISE/MIN

Figure 64

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
1	2	40	33	70	33	95	38	120	79	145	33
15	3	41	6	71	25	96	54	121	30	146	45
16	9	42	19	72	66	97	39	122	24	147	12
17	15	45	3	73	57	98	71	123	9	148	3
18	12	47	9	74	83	99	60	124	11	149	12
19	12	50	12	75	84	100	25	125	6	150	9
20	18	51	12	76	51	101	11	126	12	151	9
21	1	52	22	77	21	102	18	127	22	152	12
22	3	53	24	78	6	103	6	128	15	153	6
24	3	54	26	79	39	104	12	129	39	154	9
25	5	55	24	80	15	105	12	130	57	155	6
26	3	56	17	81	34	106	3	131	89	156	3
27	24	57	27	82	24	107	6	132	30	157	12
28	27	58	45	83	15	108	15	133	17	158	12
29	46	59	42	84	9	109	8	134	18	159	6
30	18	60	44	85	18	110	3	135	27	160	6
31	42	61	44	86	12	111	18	136	18	161	12
32	31	62	79	87	6	112	20	137	9	162	8
33	43	63	66	88	15	113	24	138	18	164	3
34	29	64	59	89	16	114	63	139	50	166	3
35	43	65	43	90	28	115	61	140	24	167	6
36	36	66	18	91	22	116	25	141	39	168	6
37	24	67	24	92	32	117	30	142	21	170	6
38	19	68	30	93	9	118	28	143	15	171	6
39	21	69	33	94	6	119	27	144	36	172	6
										173	6
										174	3
										175	6
										178	3
										179	5
										192	3

STAGE 1 WING 6 TP-H1011 BURNING RATE AT 1000 PSI

This sample size summary is applicable to figure 65

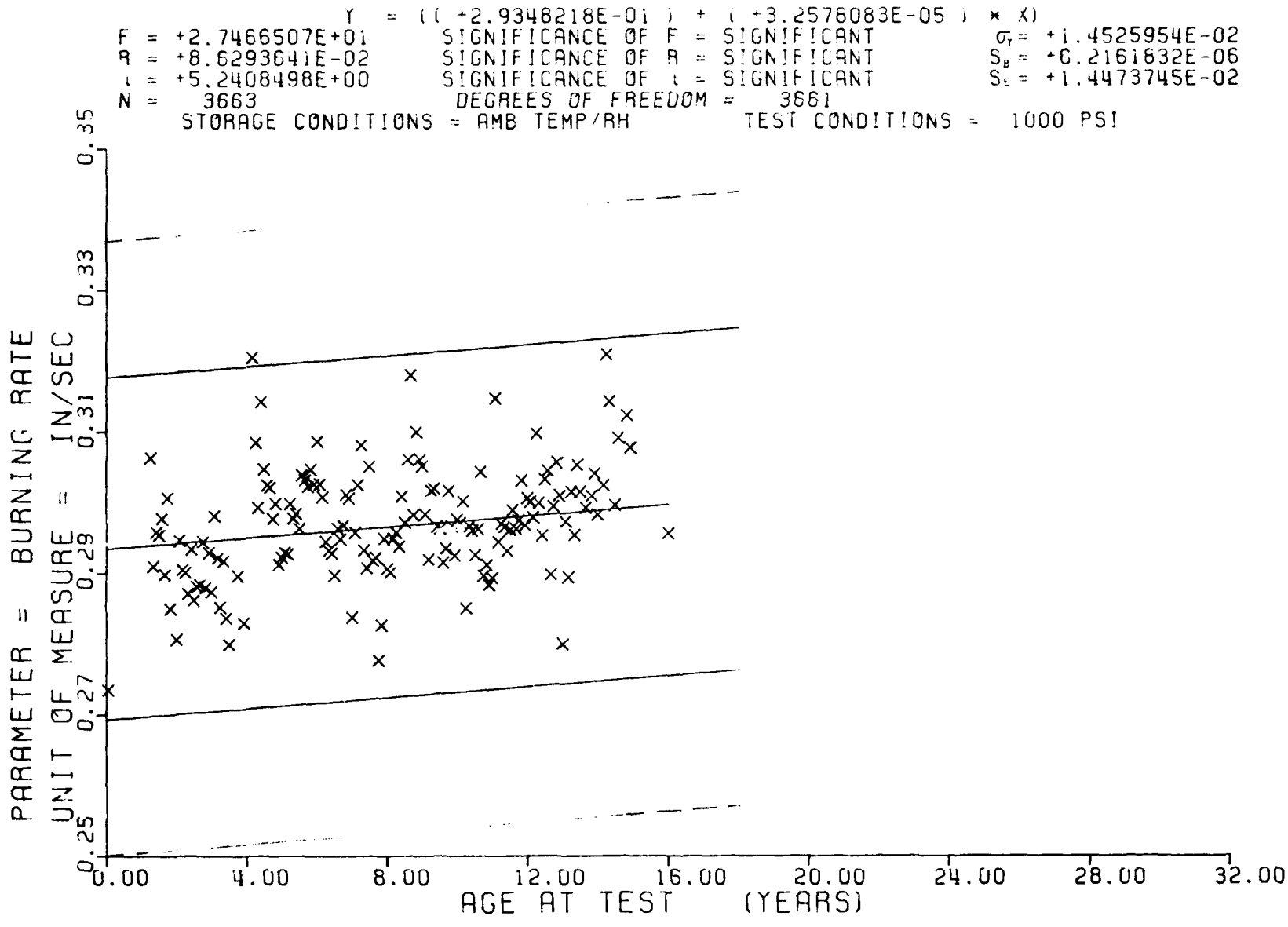

Y = ((+2.9348218E-01) + (+3.2576083E-05) * X)
F = +2.7466507E+01 SIGNIFICANCE OF F = SIGNIFICANT
R = +8.6293641E-02 SIGNIFICANCE OF R = SIGNIFICANT
t = +5.2408498E+00 SIGNIFICANCE OF t = SIGNIFICANT
N = 3663 DEGREES OF FREEDOM = 3661
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 1000 PSI
PARAMETER = BURNING RATE
UNIT OF MEASURE = IN/SEC
0.25
0.27
0.29
0.31
0.33
0.35
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
STAGE I WING 6 TP-H1011 BURNING RATE AT 1000 PSI

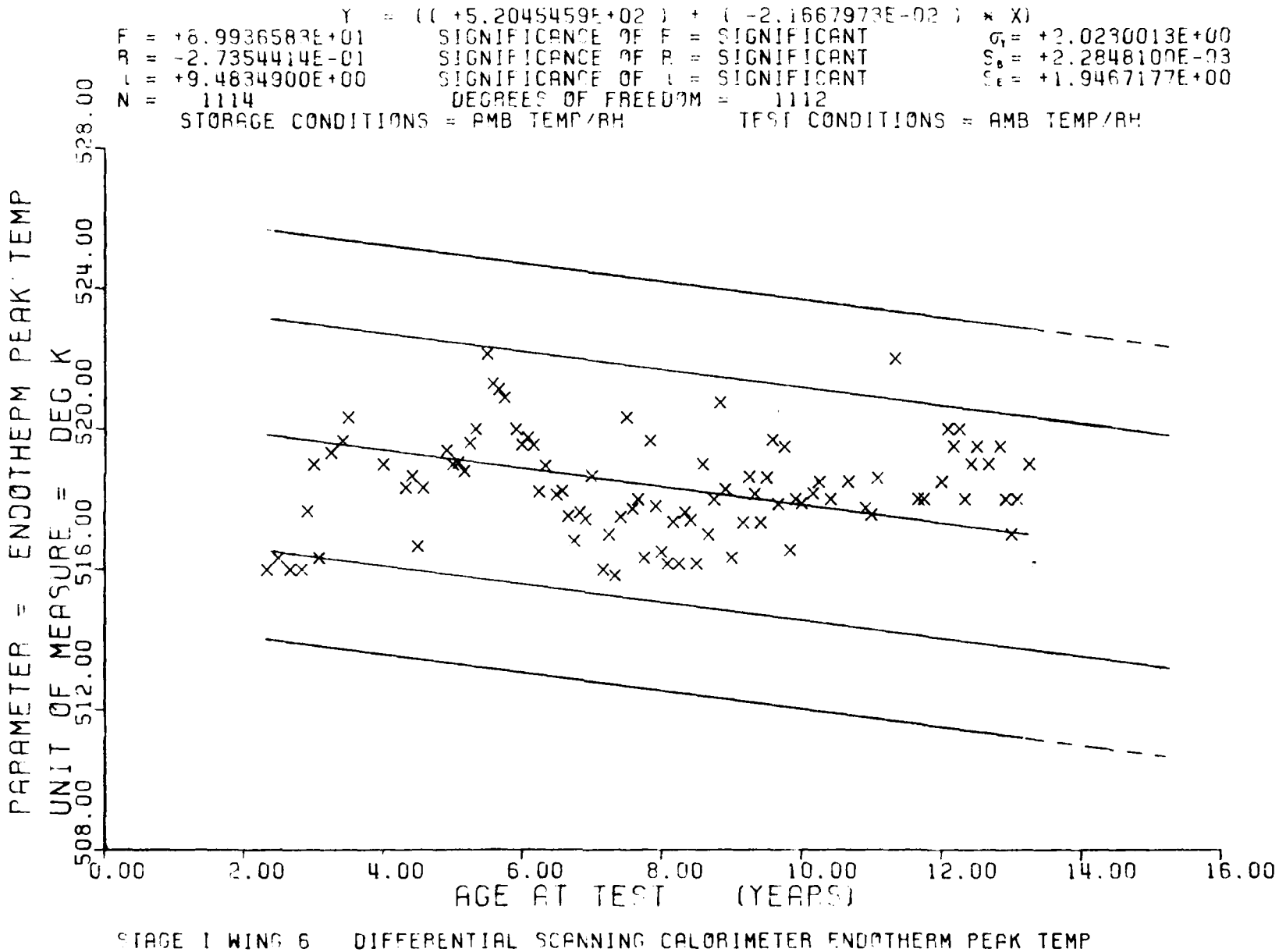
Figure 65

*** SAMPLE SIZE SUMMARY ***

AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP	AGE (MOS)	NR SAMP
29	4	71	17	98	14	128	2
30	3	72	16	99	18	131	8
32	2	73	21	100	8	132	54
34	2	74	11	101	5	133	5
35	3	75	14	102	6	136	2
36	7	76	20	103	3	140	2
37	3	78	30	104	7	141	2
39	6	79	42	105	8	144	2
41	3	80	56	106	4	145	2
42	3	81	42	107	7	146	2
48	3	82	32	108	3	147	2
52	3	83	50	110	3	148	2
53	3	84	3	111	34	149	2
54	3	86	5	112	13	150	2
55	3	87	2	113	6	152	2
59	10	88	6	114	13	154	2
60	18	89	2	115	23	155	2
61	21	90	3	116	14	156	5
62	15	91	15	117	6	157	2
63	5	92	5	118	44	159	2
64	3	93	6	119	22		
66	14	94	3	120	8		
67	54	95	5	122	6		
68	78	96	12	123	2		
69	36	97	6	125	2		

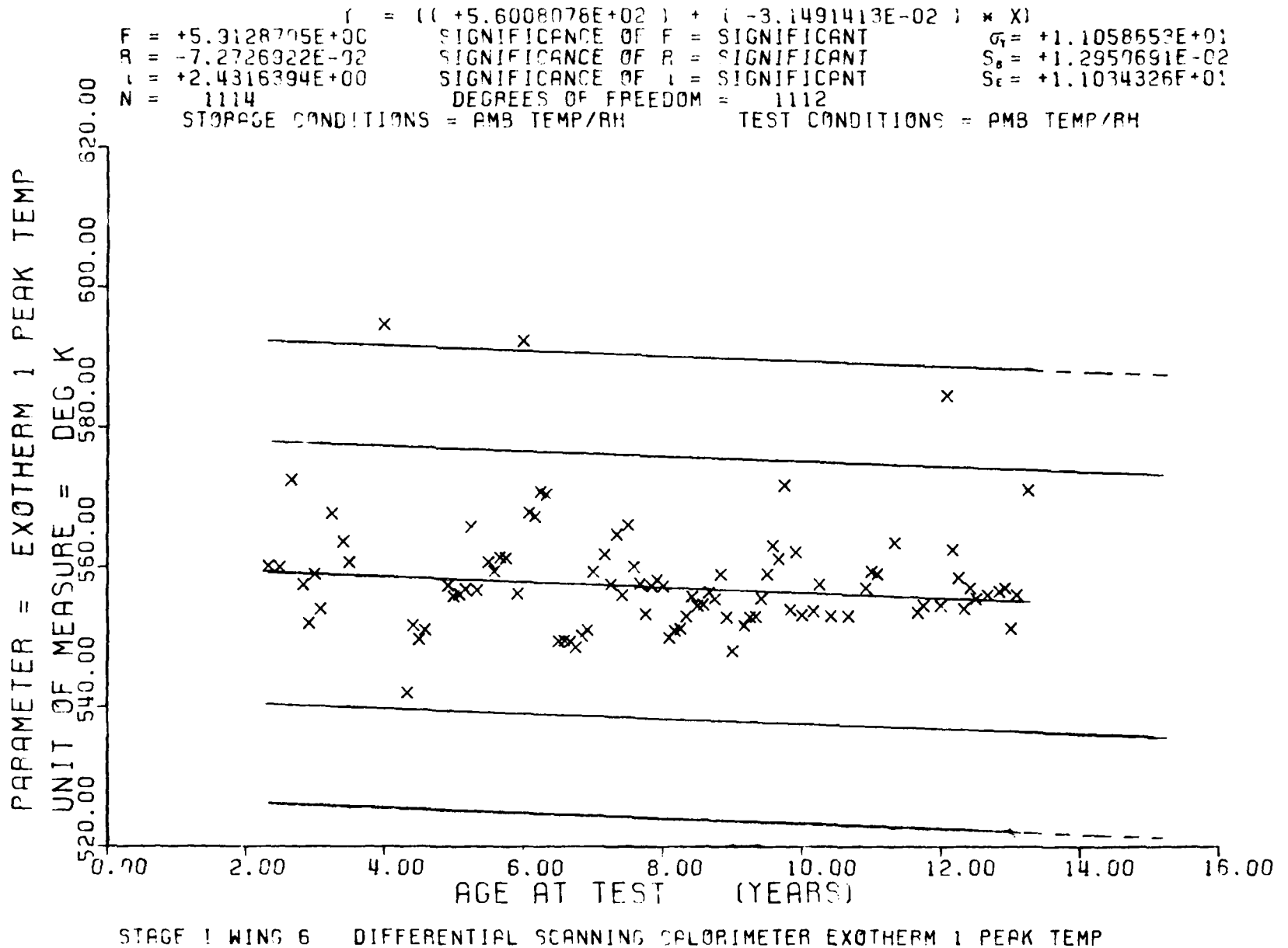
STAGE I WING 6 DIFFERENTIAL SCANNING CALORIMETER ENDOTHERM PEAK TEMP

This sample size summary is applicable to figures 66 thru 68



STAGE I WING 6 DIFFERENTIAL SCANNING CALORIMETER ENDOTHERM PEAK TEMP

Figure 66



STAGE I WING 6 DIFFERENTIAL SCANNING CALORIMETER EXOTHERM 1 PEAK TEMP

Figure 67

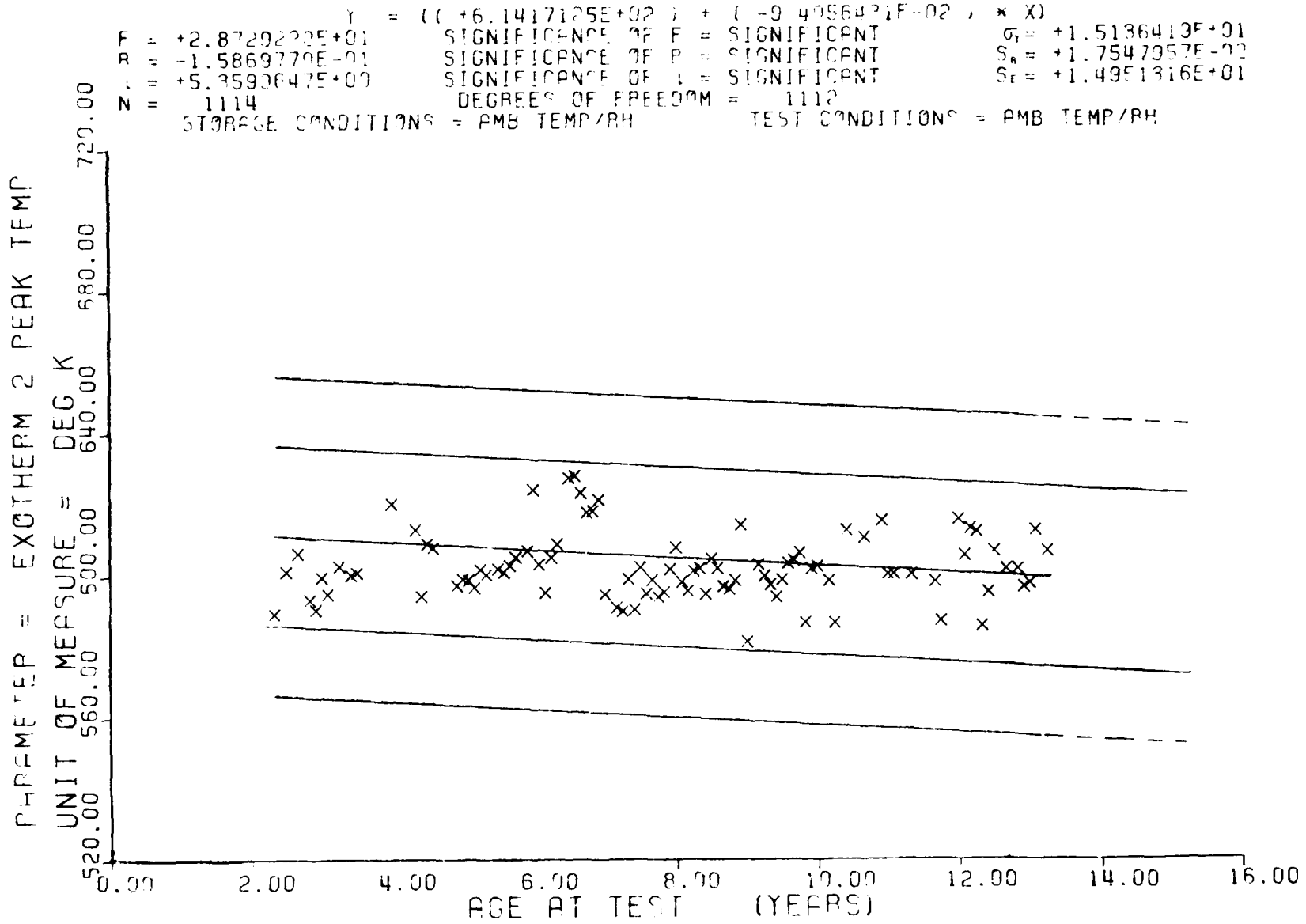

Y = ((+6.1417125E+02) + (-9.4056821E-02) * X)
F = +2.8729232E+01
B = -1.5869770E-01
t = +5.3593647E+00
N = 1114
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF B = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 1112
σ_t = +1.5136413E+01
S_B = +1.7547957E-02
S_E = +1.4951316E+01
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = EXOTHERM 2 PEAK TEMP
UNIT OF MEASURE = DEG K
720.00
680.00
640.00
600.00
560.00
520.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STAGE I WING 6 DIFFERENTIAL SCANNING CALORIMETER EXOTHERM 2 PEAK TEMP

Figure 68

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7. AUTHOR(s) John A. Thompson		
9. PERFORMING ORGANIZATION NAME AND ADDRESS Propellant Analysis Directorate OOALC		PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS MMWRBM Project M04046C-WNL01529
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20 ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

This report contains propellant test results from cartons of TP-H1011 bulk propellant representing LGM-30F & G First Stage Minuteman Motors. This report uses a statistical approach to analyze the bulk propellant data. Testing was accomplished in accordance with MMWRBM Project M04046C-WNL01529.

The data from this test period are combined with data from previous testing and entered into the G085 Computer for storage, analysis, and regression analysis. From the statistical analysis of all data tested to date (fifteen years for

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..., significant degradation of the propellant does not appear likely for at least two years past the oldest data point.

Each point on the regression plot represents the mean of all samples at that particular age. The number of samples accompanying each regression plot or group of regression plots. The data range at any age can be found by suitable inquiry of the G085 System.